meyers+associates
ARCHITECTURE

project manual for:

Springhill Suites by Marriott

Arnold Palmer Drive
Latrobe, PA 15650
M+A Project #2010-13



prepared for:

Concord Sierra Palmer Hotel Associates, LP,
Concord Hospitality Enterprises Company
8601 Six Forks Road,
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Raleigh, NC 27615

prepared by:

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Bid Documents
Issue Date: January 04, 2011

SECTION 00 00 05 - CREDITS

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B. Drawings are bound into a single set of drawings and specifications including:
1. Civil
2. Landscape
3. Architectural
4. Structural
5. Fire Protection
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PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section shall be used in conjunction with the Drawings and with related Sections of the Specifications.

PART 2 PRODUCTS

2.01 GENERAL

A. Attached is the Interior Finish Index. Refer to individual Specification Sections for further information on listed products.

PART 3 EXECUTION

Not Used

Note: See attached copy of the Current Interior Finish Index after this Section.

END OF SECTION

Revision Log

Interior Finish Index

Décor: A.I.R.

Generation: 4 – New Build & Renovation

MODIFIED FINISH SELECTIONS FOR SPRINGHILL SUITES LATROBE, PA

DATE: January 04, 2011

General Notes

1. All finish indices are specific to hotel brand; décor scheme, building generation and building cycle. (i.e. new build vs. renovation)
2. If local codes exceed the requirements contained therein, the local codes must be used as the minimum standard.
3. Any numbers not shown are assumed not used.
4. The location category will appear regimented in format starting from the generic to specific in regards to use of material.
   i.e. Guestroom – Whirlpool – Floor: Deck and Vertical Surfaces
5. Updates to the finish index will occur quarterly at a minimum and will be issued as a Bulletin. Each item in the Finish Index will include a revision date.
6. Any variation of finishes herein is to be submitted via the FFE/Interior Finish/Specification Variance Form located in the Interior Design Specification Manual. This form is to be submitted to Marriott's A&C department for approval 8 months prior to hotel opening for prototypical design and 10 months prior for custom design. Any deviation without approval is a potential violation of the franchise agreement and is subject to removal at owner's expense.
7. "Approved Substitutions" must comply with the General Conditions, the Bidding Procedures, and the intent of the various Specification Sections.
8. Finishes listed within index occur in the other building documentation. Coordinate finishes with other documents to mitigate duplication.
9. Product Specification numbers are listed in parenthesis below the Material category of each finish. See brand specific Design Guide Project Manual Master for detailed instruction and purpose.
10. Many finishes have alternate manufacturers listed in the design Guide Project Manual Master. Refer to the individual specification sections for approved manufacturers.
11. Control numbers (X-Ref) are listed where applicable and coordinate to Interior Design Specification Manual. See brand specific FFE manual for detailed information.
12. **Items shown BOLDED are items that have changed since the last revision.**
13. Finish Index Numbers shown followed by "LVP" shall be used for CFRST LEED Volume Program Projects in lieu of same Finish Index Number without the "LVP." Delete "LVP" items if project is NOT a CFRST LEED Volume Program Project.
14. Finish Number Key:
    100's=Floor Finishes
    200's=Base Finishes
    300's=Wall Finishes
    400's=Ceiling Finishes
    500's=Elevator Finishes
    LBE ###=Modified Finish selection specific to project

Marriott International
Design & Construction Services
Washington, DC

Finish #	Material Spec / X-ref	Location	Description	
LBE-100	Carpet 09 68 00 (09680) X-001	• Guestrooms	Manufacturer: Product: Color: Pattern: Size(HxWxD): Weight: FSR: Comments: Contact: Phone:	Shaw Industries, Inc. A:CE731,B:6176,C:5426D N133C/24" Box 15' 32 oz. Class 1 - ASTM E648 Repeat: 48"V, 48"H Nancy Dickinson 513.231.3733
LBE-101	Tile 09 30 00 (093000) X-XXX	• Great Room • Elevator Lobby • Market • Business library • Bar • Elevator Cabs • Bar Storage	Manufacturer: Product: Model: Color: Size(HxWxD): Comments: Contact: Phone:	Stone Peak Ceramic Tile Cottage Country Farm 4” x 24” Refer to Interior design specification manual and construction drawings for locations and patterns Karen Collins 614-633-5586
LBE-101	Grout 09 30 00 (093000) X-XXX	• Great Room • Elevator Lobby • Market • Business library • Bar • Elevator Cabs	Manufacturer: Product: Model: Color: Size(HxWxD): Contact: Phone:	Laticrete International, Inc. grout Spectra Lock Epoxy Grout 66 Chestnut Brown 1/8” Joint Width Eric Pucilowski 800.243.4788 x 520
LBE-102	Carpet 09 68 00 (09680) PG-001	• Corridor - Field	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): FSR: Comments: Contact: Phone:	Brintons Axminster Carpet Field custom DQ21ZGC 12' Class 1 - ASTM E648 Refer to Interior design specification manual for color locations for custom patterns Bob Chutes 614-457-9287

Finish #	Material Spec / X-ref	Location	Description	
LBE-102A	Carpet 09 68 00 (09680) PG-001	• Corridor -Door Drops at guestroom corridors	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): FSR: Comments: Contact: Phone:	Brintons Axminster Carpet Field custom J8251CR 12' Class 1 - ASTM E648 Refer to Interior design specification manual for color locations for custom patterns Bob Chutes 614-457-9287
LBE-103	Carpet 09 68 00 (09680) MR-001	• Reception • Lounge • Network Zone	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): FSR: Comments: Contact: Phone:	Brintons Axminster Carpet custom G3349 12' W Class 1 - ASTM E648 Refer to Interior design specification manual for color locations for custom patterns Bob Chutes 614-457-9287
LBE-103A	Carpet 09 68 00 (09680) MR-001	• Communal circle carpet inset	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): FSR: Comments: Contact: Phone:	Brintons Axminster Carpet custom J8251CR 12' W Class 1 - ASTM E648 Refer to Interior design specification manual for color locations for custom patterns Bob Chutes 614-457-9287

Finish #	Material Spec / X-ref	Location	Description	
LBE-103B	Carpet 09 68 00 (09680) MR-001	• Meeting Room -meeting room -meeting room closet • Board Room	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): FSR: Comments: Contact: Phone:	Brintons Axminster Carpet custom G3349 12' W Class 1 - ASTM E648 Refer to Interior design specification manual for color locations for custom patterns Bob Chutes 614-457-9287
LBE-104	Carpet 09 68 00 (09680) PG-001C	• Elevator Lobby (2nd - 4th Floors)	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): FSR: Comments: Contact: Phone	Brintons Axminster Carpet Field custom DQ22ZGC 12' Class 1 - ASTM E648 Refer to Interior design specification manual for color locations for custom patterns Bob Chutes 614-457-9287
LBE-105	Carpet 09 68 00 (09680)	• Administrative Offices • Work Room	Manufacturer: Product: Color: Pattern: Size(HxWxD): FSR: Contact: Phone:	Tandus – Monterey Broadloom Carpet 02422 Silt 44032 Groundwork 12' wide Class 1 - ASTM E648 Tamra Fuscaldo 614-309-8658
LBE-107	**Rubber Flooring** 09 65 00 (09650) RE-001	• Exercise Room	Manufacturer: Product: Color: Pattern: Size(HxWxD): Thickness: FSR: Comments: Contact: Phone:	EcoSurfaces Eco stone 810 Rollin' stone Tile size: 36" x 36" 6mm Class A - ASTM E-84 Refer to Project Manual Master Specifications. Michael Thompson 614-551-7928

Finish #	Material Spec / X-ref	Location	Description	
CMH-107A	**Rubber Flooring** 09 65 00 (09650) RE-001	• Exercise Room	Manufacturer: Product: Color: Pattern: Size(HxWxD): Thickness: FSR: Comments: Contact: Phone:	EcoSurfaces EcoStone 811 Sharin' Stone Tile size: 36" x 36" 6mm Class A - ASTM E-84 Refer to Project Manual Master Specifications. Michael Thompson 614-551-7928
110	Carpet Padding 09 68 00 (09680) X-003	• Guestrooms	Manufacturer: Product: Model: Size(HxWxD): Weight: Comments: Contact: Phone: Revision Date	Sponge Cushion, Inc. Flat Rubber Textured Padding 54" W x 60" = 30 SY 56 oz. Refer to Interior Design Specification Manual for Specifications. (For Stretch In Installation) Chuck Lambert 804.706.9205 4/28/2008
111	Carpet Padding 09 68 00 (09680) GR-003 MR-003 PG-003	• Great Room • Guestroom Corridor • Meeting Rooms	Manufacturer: Product: Model: Size(HxWxD): Weight: Comments: Contact: Phone: RevisionDate:	Sponge Cushion, Inc. Tred-Mor Quicklift Padding 54" width x 60" = 30 SY 68 oz. Refer to Interior Design Specification Manual for Specifications. (For Double Glue Application) Chuck Lambert 804.706.9205 4/28/2008
112	Carpet Padding 09 68 00 (09680) X-005	• Guestrooms – Accessible Units	Manufacturer: Product: Model: Size(HxWxD): Weight: Comments: Contact: Phone: Revision Date	Sponge Cushion, Inc. Padding-handi-Tred-Mor #1562 54" width x 60" = 30 SY 62 oz. Refer to Interior Design Specification Manual for Specifications. Chuck Lambert 804.706.920 2/13/2009

Finish #	Material Spec / X-ref	Location	Description	
120	Tile 09 30 00 (09310)	• Great Room - Buffet - Breakfast • Guest Laundry • Pool Corridor • Public Restrooms • Vending / Ice • Vestibule	Manufacturer: Product: Model: Color: Finish: Pattern: Size(HxWxD): Thickness: Contact: Phone: Revision Date:	Dal-Tile Corp. Porcelain Tile Field Fabrique P687 Soliel Linen Unpolished Running Board 25% overlap w/ 3/16" Joint 12" x 24" 5/16" Marsha McCauley 513.460.1168 7/13/2009
120	Tile Grout 09 30 00 (09310)	• Great Room - Buffet - Breakfast • Guest Laundry • Pool Corridor • Public Restrooms • Vending / Ice • Elevator Cabs	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc. Spectra Lock Epoxy Grout 61 Parchment 1/8" Joint Width (3/16" for DalTile) Eric Pucilowski 800.243.4788 x 520 2/13/2009
LBE-121	Tile 09 30 00 (09310)	• Vestibule (12 x 12 wall tile 4'-0" AFF) • Bag Storage • Employee Dining • Employee Restroom	Manufacturer: Product: Color: Size(HxWxD): Contact: Phone:	Crossville Color Blox Mud Pie 12" x 12" Gabe Cantrell 1.614.206.1443
	Tile Grout 09 30 00 (09310)	• Vestibule • Bag Storage • Employee Dining • Employee Restroom	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone:	Laticrete International, Inc. Spectra Lock Epoxy Grout 27 Hemp 1/8" Joint Width (3/16" for DalTile) Eric Pucilowski 800.243.4788 x 520

Finish #	Material Spec / X-ref	Location	Description	
122	Tile 09 30 00 (09310)	• Guestroom Bath - Vanity Area - Bath Compartment - Toilet Room Floor - Tub/Shower Room Floor	Manufacturer: Product: Color: Size(HxWxD): Contact: Phone: Revision Date:	Ceramic Technics, Ltd Fiorano Stone Linear Bianco 12" x 24" Gerry King 770.740.0050 x 203 2/13/2009
	Tile Grout 09 30 00 (09310)	• Guestroom Bath - Vanity Area - Bath Compartment - Toilet Room Floor - Shower Room Floor	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc. Spectra Lock Epoxy Grout 90 Light Pewter 1/8" Joint Eric Pucilowski 800.243.4788 x 520 4/28/2008
123	Tile 09 30 00 (09310)	• Guestrooms - Accessible Bath - Roll-In Shower - Bath Compartment • Employee Shower	Manufacturer: Product: Color: Finish: Size(HxWxD): Contact: Phone: Revision Date:	Dal-Tile Corp. Keystones D317 Biscuit Mat 2" x 2" Marsha McCauley 513.460.1168 5/20/2009
	Tile Grout 09 30 00 (09310)	• Guestrooms - Accessible Bath - Roll-In Shower - Bath Compartment • Employee Shower	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc. Spectra Lock Epoxy Grout 90 Light Pewter 1/8" Joint Eric Pucilowski 800.243.4788 x 520 5/20/2009

Finish #	Material Spec / X-ref	Location	Description	
LBE-124	Tile 09 30 00 (09310)	• Pool - Indoor - New Build Only	Manufacturer: Product: Pattern: Color: Finish: Size(HxWxD): Contact: Phone:	Crossville Porcelain Stone Palais Versailles CV AV141 Unpolished 6” x 6” Gabe Cantrell 614-358-7814
	Tile Grout 09 30 00 (09310)	• Pool - Indoor - New Build Only	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc Spectra Lock Epoxy Grout 61 Parchment 1/8" Joint Width Eric Pucilowski 800.243.4788 x 520 **4/1/2010**
132	**Resinous Flooring** 09 67 23-3	• Laundry Room • House Keeping Office • Food Prep • Laundry Storage • Dryer	Manufacturer: Color: Pattern: Comments: Contact: Phone:	Dur-a-Flex Camel Brown Dur-a-Quartz 1/4” decorative seamless floor Type B Flooring to have integral base with zinc channel to accommodate wall FRP Dur-a-Quartz 1.800.253.3539
LBE-132A	**Resinous Flooring** 09 67 23-3	• Pool Equipment • Pool Storage • Linen Storage - Upper Floors • Engineering / Maintenance Office - • HVAC Closet • Mechanical Room • Fire Pump • Boiler Room	Manufacturer: Color: Pattern Comments: Contact: Phone:	Dur-a-Flex Camel Brown Dur-a-Flex Shop Floor 1/8” solid color seamless floor TypeC Flooring to have integral base with zinc channel to accommodate wall FRP Dur-a-Quartz 1.800.253.3539

Finish #	Material Spec / X-ref	Location	Description	
133	Sealed Concrete 03 30 00 (03300)	• Electrical Room • Elevator - Machine Room - • Storage • PBX • CATV	Manufacturer: Comments:	Refer to Design Guide Project Manual Master for Specifications Curing and Sealing Compound, Waterbourne ASTM C1315, 25% Solids Minimum Clear Refer to Section 03300 in Design Guide Project Manual Master.
135	Floor Mats 12 48 13 (12480)	• Vestibule - At Door to Exterior	Manufacturer: Product: Finish: Color: Size(HxWxD): Comments: Contact: Phone: Revision Date:	Grand Entrance, A Division of Construction Specialties, Inc. Pedimat Brushed Aluminum Slate 9322 Must be field verified Pedimat MI clear anodized rail finish by c/s group Melissa Boyd 888.424.6287 10/22/2009
147	**Resinous Flooring** 09 67 23-3	• Stairwells	Manufacturer: Product: Pattern: Color: Comments: Contact: Phone:	General Polymers Corporation Ceramic Carpet Ceramic Carpet #400 Type A 316 Oriental Spice Refer to specifications for details Flooring to have integral base paint all railings to match General Polymers Corporation 513.761.0011
180	Quartz Threshold 12 36 61 (09385)	• Guestroom Bath - Between Tile and Carpet at Door Openings	Manufacturer: Product: Finish: Size(HxWxD): Thickness: Contact: Phone: Revision Date:	Dal-Tile Corp. One Quartz Surface NQ09: Woven Wool 4" x Width of Door 3/4" Marsha McCauley 513.460.1168 4/28/2008

Finish #	Material Spec / X-ref	Location	Description	
181	**Granite Threshold** 12 36 61	• Guestrooms - Connector Door - Between Carpet and Carpet	Manufacturer: Product: Model: Color: Size(HxWxD): Thickness: Comments: Contact: Phone:	 Granite Threshold Impala Black See sheet A-921 for transition details
182	**Granite Threshold** 12 36 61	• Guestrooms - Entry - Between Carpet and Carpet	Manufacturer: Product: Model: Color: Size(HxWxD): Thickness: Comments: Contact: Phone:	 Granite Threshold Impala Black See sheet A-921 for transition details
190	Transition Strip 09 65 00 (09650)	• Back of House Spaces - All - Carpet to Tile • Public Spaces - All - Carpet to Tile	Manufacturer: Color: Pattern: Contact: Phone: Revision Date:	Schluter Systems Stainless Steel Scheine Earl Maicus 800.472.4588 x 111 4/28/2008
191	Transition Strip 09 65 00 (09650)	• Back of House Spaces - All - Tile to Tile - New Build Only • Public Spaces - All - Tile to Tile - New Build Only	Manufacturer: Color: Pattern: Contact: Phone: Revision Date:	Schluter Systems Stainless Steel Schluter-Deco Earl Maicus 800.472.4588 x 111 4/28/2008
192	Transition Strip 09 65 00 (09650)	• Mechanical Room - Carpet to Concrete - New Build Only • Pool - Tile to Concrete - New Build Only	Manufacturer: Model: Color: Contact: Phone: Revision Date:	Burke Flooring, A Division of Burke Industries Profile 160 Black 701 Julie Tackett 800.447.8442 x 1014 4/28/2008

Finish #	Material Spec / X-ref	Location	Description	
193	Transition Strip 09 65 00 (09650)	• Back of House - Tile to Epoxy/VCT - New Build Only	Manufacturer: Model: Color: Contact: Phone: Revision Date:	Burke Flooring, A Division of Burke Industries Profile 710 Black 701 Julie Tackett 800.447.8442 x 1014 4/28/2008
194	Transition Strip 09 65 00 (09650)	• Back of House Spaces - All - Carpet to Epoxy/VCT • Public Spaces - All - Carpet to Epoxy/VCT	Manufacturer: Model: Color: Contact: Phone: Revision Date:	Burke Flooring, A Division of Burke Industries Profile 930 Snap Down T Black 701 Julie Tackett 800.447.8442 x 1014 4/28/2008
LBE-200	Carpet Base 09 68 00 (09680) PG-002 MR-002 OA-002ALT	• Corridor • Elevator Lobbies - (2nd floor and up)	Manufacturer: Product: Color: Pattern Size(HxWxD): Weight: Edge: FSR: Comments: Contact: Phone:	Brintons Tufted Cut Pile custom J8251CR 4" High 32 oz. Prebound Top Edge Class A - ASTM E84 Refer to Interior design specification manual for color locations for custom patterns Bob Chutes 614-457-9287
LBE-201	Rubber Base 09 65 00 (09650)	• Back of House • Stairwell - (If Code Requires)	Manufacturer: Product: Color: Size(HxWxD): Thickness: Edge: FSR Comments: Contact: Phone:	Roppe Corporation, USA Pinnacle Rubber Base 114 Lunar Dust 4" High 1/8" Standard Toe Base (5/8") Class A - ASTM E84 Refer to Interior Design Specification Manual for Specifications. Southland Flooring Supplies 614.443.6597
LBE-202	Carpet Base 09 68 00 (09680)	• Administrative -work rooms	Manufacturer: Model: Color: Pattern: Size(HxWxD): Weight: Edge: FSR: Comments: Contact: Phone:	Tandus - monterey Carpet base 02422 Silt 44032 groundwork 4" Bound Prebound Top Edge Class A Refer to Interior Design Specification Manual for Specifications. Tamra Fuscaldo 614.309.8658

Finish #	Material Spec / X-ref	Location	Description	
LBE-203	Carpet Base 09 68 00 (09680) X-002A	• Guestrooms	Manufacturer: Pattern: Color: Size(HxWxD): Weight: Edge: FSR Comments: Contact: Phone:	Shaw Industries, Inc. N486C Custom 4" Bound 30oz. Prebound Top Edge Class A Refer to Interior Design Specification Manual for Specifications. Nancy Dickinson 513.231.3733
LBE-210	Tile Base 09 30 00 (09310)	• Guest Laundry • Lobby • Pool Corridor • Vending / Ice • Buffet	Manufacturer: Product: Model: Color: Finish: Size(HxWxD): Thickness: Edge: Contact: Phone:	Dal-Tile Corp. Porcelain Tile Field Fabrique P687 Soliel Linen Unpolished 4” x 24” 5/16" Schluter – Jolly 5/16” Marsha McCauley 513.460.1168
	Tile Grout 09 30 00 (09310)	• Guest Laundry • Lobby • Pool Corridor • Vending / Ice • Buffet	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc Spectra Lock Epoxy Grout #61 Parchment 1/8" Joint Width Eric Pucilowski 800.243.4788 x 520 2/13/2009
LBE-211	Wood Base 12 30 00	• Meeting Room • Board Room	Manufacturer: Pattern: Color: Size(HxWxD): Contact: Phone:	Koetter Wood Working 18136 OGEE / B Stain to match Natural Teak (3051-VT Laminart) 4” high Koetter Wood Working 812.923.8875

Finish #	Material Spec / X-ref	Location	Description	
212	Tile Base 09 30 00 (09310) Option 2	• Guestrooms – Bath	Manufacturer: Product: Color: Size(HxWxD): Contact: Phone: Revision Date:	Ceramic Technics, Ltd Fiorano Stone Linear Bianco 4.2" x 25.4" Gerry King 770.740.0050 x 203 4/28/2008
212	Tile Grout 09 30 00 (09310)	• Guestrooms - Bath	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc Spectra Lock Epoxy Grout 90 Light Pewter 1/8" joint width Eric Pucilowski 800.243.4788 x 520 1/3/2011
212	Tile Grout 09 30 00 (09310)	• Guestrooms - Bath	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Mapei, Inc. OptiColor 01 Alabaster 1/8" joint width Mari Anne Wohlfeil 847.228.9911 1/3/2011

Finish #	Material Spec / X-ref	Location	Description	
213	Tile Base 09 30 00 (09310)	• Guestrooms - Accessible Bath - Bath Compartment - - Roll-In Shower - Bath Compartment • Employee Shower	Manufacturer: Producl: Color: Size(HxWxD): Contact: Phone:	Dal-Tile Corp. Keystones D317 Biscuit 2" x2" Mosaic Marsha McCauley 513.460.1168
	Tile Grout 09 30 00 (09310)	• Guestrooms - Accessible Bath - Bath Compartment - - Roll-In Shower - Bath Compartment • Employee Shower	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc. Spectra Lock Epoxy Grout 90 Light Pewter 1/8" joint width Eric Pucilowski 800.243.4788 x 520 1/3/2011
213	Tile Grout 09 30 00 (09310)	• Guestrooms - Accessible Bath - Bath Compartment - - Roll-In Shower - Bath Compartment • Employee Shower	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Mapei, Inc. OptiColor 01 Alabaster 1/8" joint width Mari Anne Wohlfeil 847.228.9911 1/3/2011
LBE-214	Tile Base 09 30 00 (09310)	• Pool - Indoor - Wall Base	Manufacturer: Product: Model: Color: Finish: Size(HxWxD): Thickness: Contact: Phone:	Crossville Inc Porcelain Base Palais Versailles AV141 Unpolished 6” x 12” 3/8" Gabe Cantrell 614.358.7814
	Tile Grout 09 30 00 (09310)	• Pool - Indoor - Wall Base	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone:	Laticrete International, Inc. Spectra Lock Epoxy Grout 61 Parchment 1/16" Self Spacing Tiles Eric Pucilowski 800.243.4788 x 520

Finish #	Material Spec / X-ref	Location	Description	
LBE-215	Tile Base 09 30 00 (09310)	• Vestibule • Bag Storage • Employee Dining • Employee Shower	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone:	Crossville Inc. Color Blox Mud Pie 4 x 12” bullnose with schluter Gabe Cantrell 614.206.1443
	Tile Grout 09 30 00 (09310)	• Pool - Indoor - Wall Base	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone:	Laticrete International, Inc. Spectra Lock Epoxy Grout 27 Hemp 1/16" Self Spacing Tiles Eric Pucilowski 800.243.4788 x 520
LBE-218	Rubber Base 09 65 00 (09650)	• Exercise Room	Manufacturer: Product: Color: Size(HxWxD): Contact: Phone:	Johnsonite Rubber Millwork base - Reveal MW-01 –F Black 6" H Laurie Baatz 440.313.8238
220	Rubber Base 09 65 00 (09650)	• Janitor Closet • Television / Video • Water Heater • Storage • Electrical • Bar storage	Manufacturer: Product: Color: Size(HxWxD): Edge: Contact: Phone:	Roppe Corporation, USA Rubber Base Natural 122 4" H Standard Toe Base (5/8") Southland Flooring Supplies 614.443.6597

Finish #	Material Spec / X-ref	Location	Description	
221	Melamine 12 30 00 (06400)	• "The Market" • Lobby - Registration Desk -	Manufacturer: Finish: Comments: Revision Date:	Refer to Design Guide Project Manual Master for Specifications Black Matte 4" Height Continuous Base 4/28/2008
LBE-223	**Stainless Steel Column cuff / Base** 05 50 00	• Lobby -Column cuff • Market Wall • Display Wall -Elevator Lobby • Half Height Entry Wall • Business Library • Case Work -Bar -Communal Table -Network Zone	Manufacturer: Color: Finish: Comments:	Elite Expressions Stainless steel #4 brushed 4” High Stainless steel column cuff Submit sample to Architect for approval -Seal top and bottom with clear caulk per health department requirements.
LBE-300	Wall Covering 09 72 00 (09950) V-300	•Admin •Work Room •Reception Desk •Great Room •Corridors	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): Weight: FSR: Type: Contact: Phone:	D.L. Couch Vinyl Wallcovering Oleander Barcelona 2VBC-21 54” Width 20 oz. Class A - ASTM E84 II Bill Wooten 614.634.0324
LBE-301	Wall Covering 09 72 00 V-301	• Meeting Rooms	Manufacturer: Product: Pattern: Color: Size(HxWxD): Weight: FSR: Type: Contact: Phone:	Color and Design Vinyl Wallcovering Kiito Curry CD2-KTO-15 54" 20 oz. Class A - ASTM E84 II Danielle Cremeans 614.425.5927

Finish #	Material Spec / X-ref	Location	Description
LBE-301A	Wall Covering 09 72 00 V-301	• Meeting Rooms - above trim	Manufacturer: Carnegie Product: Vinyl Wallcovering Color: W20 Pattern: Canyon 7008 Size(HxWxD): 35" Weight: 20 oz. FSR: Class A - ASTM E84 Type: II Contact: Belinda Binford Phone: 513.310.6696
LBE-301B	Wall Covering 09 72 00 V-301	• Meeting Rooms - Accent behind credenza	Manufacturer: Sondra Alexander Product: Vinyl Wallcovering Color: V. Adriana 3B21-55 Pattern: Indulgence Size(HxWxD): 54" Weight: 20 oz. FSR: Class A - ASTM E84 Type: II Contact: Bill Wooten Phone: 614.634.0324
LBE-303	Wall Covering 09 72 00 (09950) V-303	• Public Restrooms •Guest Laundry	Manufacturer: Versa Product: Vinyl Wallcovering Color: A95-836 Sagebrush Pattern: Sakai Silk Size(HxWxD): 54" Weight: 20 oz FSR: Class A - ASTM E84 Type: II Contact: Bob Peitrie Phone: 614.582.4780
LBE-304	Wall Covering 09 72 00 (09950) V-303	• Board Room	Manufacturer: Vycon Product: Vinyl Wallcovering Color: Y462781C Pattern: Inner Circle Size(HxWxD): 54" Weight: 20 oz FSR: Class A - ASTM E84 Type: II Contact: Steve Seymour Phone: 740.815.1529

Finish #	Material Spec / X-ref	Location	Description	
306	Wall Covering 09 72 00 (09950) V-306	• Guestrooms - Headboard Wall - Accent Vinyl - New Build - See elevations for specific locations	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): Weight: FSR: Type: Contact: Phone:	MDC Wallcoverings Vycon Vinyl Wallcovering Brio Lemon Grass MAR402 54"W 20 oz. Class A - ASTM E84 II Steve Seymour 740.815.1529
LBE-307	Wall Covering 09 72 00 (09950) V-307	• Guestrooms - Bath - Bath Compartment & Vanity Area - • Guestrooms - Toilet - Toilet & Shower Compartment - New Build - See Elevations for specific vinyl locations	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): Weight: FSR: Type: Contact: Phone:	Source One - Serendipity Vinyl Wallcovering 2SE-1166 Nickel Decora 54"W 20 oz. Class A - ASTM E84 II Bill Wooten 614.634.0324
LBE-308	Wall Covering 09 72 00 (09950) V-308	• Corridor • Guestroom Corridor • Vending / Ice	Manufacturer: Product: Color: Pattern: Size(HxWxD): Weight: FSR: Type: Comments: Quote No: Contact: Phone:	Vycon Wall Covering Y46246GR Fresh cut Grassroots 54" 20 oz. Class A - ASTM E84 II See corridor and elevator enlarged plans for locations 40536830 Steve Seymour 740.815.1529
LBE-309	Wall Covering 09 72 00 (09950) V-308A	• Coffee Station	Manufacturer: Product: Model: Color: Pattern: Size(HxWxD): Weight: FSR: Type: Comments: Contact: Phone	 Custom Wall Graphic 54" 20 oz. Class A - ASTM E84 II See corridor and elevator enlarged plans for locations

Finish #	Material Spec / X-ref	Location	Description
LBE-310	Wall Covering 09 72 00 (09950) V-310	• Guestrooms - TV Wall	Manufacturer: Carnegie Product: Wall Covering Color: W23 Pattern: Canyon 7008 Size(HxWxD): 35"W Weight: 20 oz. FSR: Class A - ASTM E84 Type: II Contact: Belinda Binford Phone: 513.310.6696
311	Cast Polymer 06 61 13 (06610)	• Guestroom Bath - Shower Surround - New Build - Tub Surround - New Build	Manufacturer: Mincey Marble Manufacturing Product: Co. Model: Cast Polymer Color: TS-VN 6 x 24 Horizontal Finish: Pattern Pattern: #2250 Solid White Solid White #2250 Matte 6 x 24 Horizontal Pattern Contact: Donna Mincey Phone: 800.533.1806
LBE-312	Wall Covering 09 72 00 (09950) V-312	• Great Room -Column Wrap (column base to be LBE-223)	Manufacturer: Surface Materials Product: Vinyl Wallcovering Color: V-47804 Pattern: Size(HxWxD): Weight: 20oz, FSR: Class A - ASTM E84 Type: II Contact: Emily Petrovski Phone: 614.327.2936
LBE-313	Wall Covering 09 72 00 (09950) V-313	• Exercise Room	Manufacturer: Versa Product: Wall Covering Pattern: Wave Lengths Color: Mineral A115-827 Size(HxWxD): 52/54” Weight: 28 oz. FSR: Type: Class A - ASTM E84 II Contact: Bob Peitrie Phone: 614.582.4780

Finish #	Material Spec / X-ref	Location	Description	
LBE-313A	Wall Covering 09 72 00 (09950) V-313A	• Exercise Room	Manufacturer: Product: Model: Color: Finish: Pattern: Size(HxWxD): Weight: FSR: Type: Comments: Contact: Phone:	T.B.D. Graphic Vinyl Wallcovering Custom Image Custom Image See Interior Elevations 20 oz. Class A - ASTM E84 II Note: Level 5 wall preparation of Gypsum Board recommended. (Refer Project Manual Master Section 09 21 16) Bill Wooten 614.634.0324
LBE-314	Wall Covering 09 72 00 (09950) V-314	• Reception Desk	Manufacturer: Product: Model: Color: Finish: Pattern: Size(HxWxD): Weight: FSR: Type: Comments: Contact: Phone:	T.B.D. Graphic Vinyl Wallcovering Custom Image Custom Image See Interior Elevations 20 oz. Class A - ASTM E84 II Note: Level 5 wall preparation of Gypsum Board recommended. (Refer Project Manual Master Section 09 21 16) Bill Wooten 614.634.0324
LBE-315A	Wall Covering 09 72 00 (09950)	• Elevator Lobby Graphics -Second Floor	Manufacturer: Product: Pattern: Size(HxWxD): Weight: FSR: Type: Contact: Phone:	 Class A - ASTM E84 II
LBE-315B	Wall Covering 09 72 00 (09950)	• Elevator Lobby Graphics -Third Floor	Manufacturer: Product: Pattern: Size(HxWxD): Weight: FSR: Type: Contact: Phone:	 Class A - ASTM E84 II

Finish #	Material Spec / X-ref	Location	Description
LBE-315C	Wall Covering 09 72 00 (09950)	• Elevator Lobby Graphics -Fourth Floor	Manufacturer: Product: Pattern: Size(HxWxD): Weight: FSR: Class A - ASTM E84 Type: II Contact: Phone:
LBE-317	Paint 09 90 00 (09900)	• Employee Restroom • Entry Vestibule Color: (above tile wainscot) • Employee Dining (satin paint finish)	Manufacturer: Sherwin-Williams Co. Color: SW 6364 Egg White Finish: Satin Contact: Rick May Phone: 610.647.9115 x 102 Revision Date: 10/6/2008
LBE-318	Wall Covering 09 72 00 (09950)	• Meeting Room Inset at entry doors • TV Communal Table Wall	Manufacturer: D.L. Couch Pattern: Ryugu Color: SGY-06-COCO Size(HxWxD): 36” Weight: 15oz. FSR: Class A Type: II Contact: Bill Wooten Phone: 614.634.0324
LBE-319	Wall Covering 09 72 00 (09950)	• TV wall at Bar	Manufacturer: D.L. Couch Pattern: Ryugu Color: SGY-12-Dark Copper Size(HxWxD): 36” Weight: 15oz. FSR: Class A Type: II Contact: Bill Wooten Phone: 614.634.0324

Finish #	*Material Spec / X-ref*	*Location*	*Description*	
LBE-321	Paint 09 90 00 (09900)	• Pool - Indoor -Walls	Manufacturer: Product: Color: Finish: Comments: Contact: Phone:	Sherwin-Williams Co. Water Based Acrylic Epoxy SW 6356 Copper Mountain Texturi3 or Sto-Deco coat, see specifications Refer to Design Guide Project Manual for Specifications. Rick May 610.647.9115 x 102
323	Paint 09 90 00 (09900)	• Electrical Closet • Elevator - Machine Room • HVAC Closet • Linen Storage • Maintenance Office • Mechanical Room • Stairwells • Storage - Typical • Building Engineer's Office	Manufacturer: Color: Finish: Contact: Phone:	Sherwin-Williams Co SW7006 Extra White Eggshell Rick May 610.647.9115 x 102
LBE-323A	**Glass Fiber Reinforced Panels** 06 82 00	• Pool Equipment room • Food Prep • Laundry Room • Laundry Room Storage • House Keeping office • Janitor closet • Electrical • Fire Pump Room • Boiler Room • Bag Storage • Bar Storage • Corridor 100G	Manufacturer: Color: Comments: Contact: Phone:	Marlite White FRP to be full height Marlite 330.343.6621
LBE-323B	**Glass Fiber Reinforced Panels** 06 82 00	• Bar equipment wall	Manufacturer: Color: Comments: Contact: Phone:	Marlite Black FRP to be full height Marlite 330.343.6621

Finish #	Material Spec / X-ref	Location	Description
LBE-330	Tile 09 30 00 (09310)	• Pool - Indoor -Accent Wall	Manufacturer: RealStone Product: Shadow Stone Color: Teracotta Size(HxWxD): Thickness: Comments: Tile to be installed horizontally Contact: Gabe Cantrell Phone: 614.358. 7814
	Tile Grout 09 30 00 (09310)	• Pool - Indoor - Accent Wall	Manufacturer: Laticrete International, Inc. Model: Spectra Lock Epoxy Grout Color: 61 Parchment Size(HxWxD): 1/8" Contact: Eric Pucilowski Phone: 800.243.4788 x 520
LBE-330A	Tile 09 30 00 (09310)	• Pool Wall Cap / Trim	Manufacturer: Kate-Lo Product: Model: Color: CVS-D10 Finish: Sealed Size(HxWxD): Thickness: Comments: Contact: Phone:
	Tile Grout 09 30 00 (09310)	• Pool Wall Cap / Trim	Manufacturer: Laticrete International, Inc. Model: Spectra Lock Epoxy Grout Color: 61 Parchment Size(HxWxD): 1/8" Contact: Eric Pucilowski Phone: 800.243.4788 x 520
LBE-331	Decorative Acrylic Resin Panels 06 64 00 (06600)	• Lobby -Feature wall • Half Height partition wall	Manufacturer: 3form, Inc. Product: Resin Panel Model: Bear Grass Color: Bear Grass Finish: Patent Size(HxWxD): 4' x 10' Thickness: 1/4" Comments: Order ID: Contact: Susan Studer Phone: 859.653.4069

Finish #	Material Spec / X-ref	Location	Description	
LBE-333	Decorative Acrylic Resin Panels 06 64 00 (06600)	• Reception Desk	Manufacturer: Product: Model: Color: Finish: Size(HxWxD): Thickness: Contact: Phone:	3form, Inc. Resin Countertop Chroma Ivory Renew 4' x 10' 1" Susan Studer 859.653.4069
LBE-334	Tile 09 30 00 (09310)	• Public Restrooms - Base and Wall Field behind toilet only • Drinking fountain wall (up to 4’ in height)	Manufacturer: Product: Color: Finish: Pattern: Size(HxWxD): Thickness: Edge: Contact: Phone:	Dal-Tile Corp. Porcelain Tile Field P687 Soliel Linen Unpolished Fabrique 6" x 24" 5/16" Schluter, Jolly 5/16” Marsha McCauley 513.460.1168
	Tile Grout 09 30 00 (09310) Option 1	• Public Restrooms - Base and Wall Field behind toilet only - New Buid Only	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc Spectra Lock Epoxy Grout 61 Parchment 1/16" Eric Pucilowski 800.243.4788 x 520 4/28/2008

Finish #	Material Spec / X-ref	Location	Description	
LBE-335	Tile 09 30 00 (09310) Option 1	• Guestrooms - Bath -Mirrors	Manufacturer: Product: Model: Color: Size(HxWxD): Finish: Contact: Phone:	Crossville, Inc. Recycled glass tile CV For Keeps EG020.101032BP 1” x 3” Frosted Gabe Cantrell 614.358.7814
	Tile Grout 09 30 00 (09310)	• Guestrooms - Bath - Toilet & Shower Compartment - New Build Only - See Elevations for specific tile locations	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Laticrete International, Inc. Spectra Lock Epoxy Grout 90 Light Pewter 1/8" Joint Width Eric Pucilowski 800.243.4788 x 520 4/28/2008
	Tile Grout 09 30 00 (09310)	• Guestrooms - Bath - Toilet & Shower Compartment - New Build Only - See Elevations for specific tile locations	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: Revision Date:	Mapei, Inc. OptiColor 01 Alabaster 1/8" Joint Width Mari Anne Wohlfeil 847.228.9911 **4/1/2010**

Finish #	Material Spec / X-ref	Location	Description
LBE-336	Tile 09 30 00 (09310)	• Pool - Indoor -at Waterline • Pool – Wall Accent (4' high)	Manufacturer: Crossville Inc. Product: Porcelain Tile Model: Color: AV141 Versailles Pattern: Palais Finish: Unpolished Thickness: 3/8" Size: 2" x 2" Contact: Gabe Cantrell Phone: 614.358.7814
336	Tile Grout 09 30 00 (09310)	• Pool - Indoor - Top Border	Manufacturer: Laticrete International, Inc. Model: Spectra Lock Epoxy Grout Color: 61 Parchment Size(HxWxD): Self Spacing Contact: Eric Pucilowski Phone: 800.243.4788 x 520
LBE-339	Stained Millwork 12 30 00 (06400)	• Great Room - Communal Circle -Communal Table • Bar Front (see Interior Elevations for details) • Front Desk (see Interior Elevations for details) • Half Height entry partition • Business Library	Manufacturer: Refer to Design Guide Project Manual Color: Master for Specifications Stain to Match: Laminart Finish: #3037 – VT Vintage Rosewood Satin
LBE-339A	Laminate Casework 06 20 00	• Fitness Casework	Manufacturer: Laminart Color: #3037 – VT Vintage Rosewood Finish: Velva Tex
342	Plastic Laminate 06 20 00	• Administrative Area -Cabintes and Countertops • Employee Dining -Cabinets and Countertops • Food Prep - Cabinets • Fitness Room Cabinet • Public Restroom • Buffet, juice station	Manufacturer: Lamin-Art, Inc. Color: 3051-VT Natural Teak Contact: Kristen Davis Phone: 614.886.9345

Finish #	Material Spec / X-ref	Location	Description	
343	Plastic Laminate 08 14 00 (08200)	• Guestrooms - Connecter Doors - Both Sides -toilet room doors -bath room doors •Public Door - Both Sides •Entry Door - Both Sides • All plastic laminate veneered doors •Public Restrooms – Toilet •Compartment Doors	Manufacturer: Color: Contact: Phone:	Wilson art 7209K-78 Nepal Teak Leslie Reed 614.893.6853
346	Stained Millwork 12 30 00 (06400)	• Elevator Lobby - Elevator Door Surround - 1st Floor Only • Great Room - "The Market" - Millwork • Guestroom Bath - Vanity Cabinet - • Guestrooms - Bath - Doors - • Guestrooms - Toilet - Doors - • Meeting Room - Millwork •Board Room – Millwork • Bar Back - Millwork	Manufacturer: Color: Finish:	Refer to Design Guide Project Manual Master for Specifications Stained to Match Laminart 3051-VT Natural Teak Satin
LBE-347	**Paint** 09 90 00 (09900)	• All interior hollow metal door frames • Guestroom corridor (at gypsum ceiling) • Elevator Lobbies (floors 2,3,&4)	Manufacturer: Color: Finish: Contact: Phone:	Sherwin-Williams Co. SW 7690 Townhall Tan Frames (Semi Gloss) Gyp. ceiling (Flat) Rick May 610.647.9115 x 10
LBE-353	Plastic Laminate 08 14 00 (08200)	• Inside of all back of house cabinetry	Manufacturer: Color: Finish Contact: Phone:	Wilson Art 1570-60 White Leslie Reed 614.893.6853
LBE-360	Quartz Countertop 12 36 61 (09385)	• Buffet • Juice Station • Business Library • Coffee Station • Communal Table • Network Zone • Bar • Reception Desk • Public Restroom • Guestroom Bath Vanity tops • Guestroom kitchenette • Meeting and Board room countertops	Manufacturer: Product: Color: Comments: Contact: Phone:	Cambria Desert Collection Cuddington 0850 All quartz counters to have eased edge Lisa Perfetto 612.226.9310

Finish #	*Material Spec / X-ref*	*Location*	*Description*	
LBE-361	Paint 09 90 00 (09900)	• Guestrooms	Manufacturer: Color: Finish: Contact: Phone:	Sherwin-Williams Co. SW 7010 White Duck Eggshell Rick May 610.647.9115 x 102
LBE-367A	Corner Guards 10 26 00 (10260)	• All public areas (See sheets A-400c, A-401c, A-403, A-404 for location	Manufacturer: Product: Color: Finish: Comments: Contact: Phone:	C/S Acrovyn SSM-20AN 90 Degree 102 Desert Sand Pebblette Texture full height above base with aluminum retainer BWASouth 614.876.2477
LBE-367B	Corner Guards 10 26 00 (10260)	• All back of house areas	Manufacturer: Product: Color: Comments: Contact: Phone:	C/S Acrovyn CO-8 16 Gauge 90 Degree Stainless Steel fastened to wall 3-1/2” Full Height above base use SCO-8 for end walls BWASouth 614.876.2477
LBE-367C	Corner Guards 10 26 00 (10260)	• Elevator Lobbies	Manufacturer: Product: Color: Finish: Comments: Contact: Phone:	C/S Acrovyn Recessed Corner guard, FS-20N Faux wood, Royal Oak #385 Pebblette Texture 3” full height above base BWASouth 614.876.2477

Finish #	Material Spec / X-ref	Location	Description	
LBE-371	Tile 09 30 00 (09310)	• Great Room -Buffet – Breakfast -Juice Counter	Manufacturer: Product: Model: Color: Finish: Size(HxWxD): Thickness: Contact: Phone:	Dal-Tile Porcelain Tile Earthen Artfolio AT02 Ice Cube Glazed 3” x 6” 3/8” Marsha McCauley 513.460.1168
	Tile Grout 09 30 00 (09310)	• Great Room -Buffet – Breakfast -Juice Counter	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone:	Laticrete International, Inc. Spectra Lock Epoxy Grout 44 Bright White 1/16" Spacing Eric Pucilowski 800.243.4788 x 520
371	Tile Grout 09 30 00 (09310)	• Great Room -Buffet – Breakfast -Juice Counter	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone: :	Mapei, Inc. OptiColor 13 French Vanilla 1/16" Spacing Mari Anne Wohlfeil 847.228.9911
375	Buffet Sneeze Guard 11 40 00 (11400)	• Great Room - Buffet - Breakfast - Buffet Shield System (Sneeze Guard)	Manufacturer: Color: Finish: Contact: Phone: Revision Date:	Brass Smith Inc. Marriott Satin Nickel Powder Coat Technical Assistance 800.662.9595 4/28/2008
380	Tempered Glass 08 80 00 (08800)	• Great Room - Buffet - Breakfast - Sneeze Guard	Manufacturer: Model: Color: Comments: Revision Date:	To Be Determined Tempered Glass Clear Refer to Design Guide Drawings and Project Manual 4/28/2008

Finish #	Material Spec / X-ref	Location	Description	
385	Laminate 06 64 00 (06600)	• Bar • Guest Laundry	Manufacturer: Color: Pattern: Contact: Phone:	Wilson Art Satin Brushed Natural Aluminum 6257 (419) Leslie Reed 614.893.6853
388	Stain 09 90 00 (09900)	• Guestrooms - Vanity Apron	Manufacturer: Color: Finish: Contact: Phone: Revision Date:	Sherwin-Williams Co. Stain to Match Laminart 3051 VT Natural Teak Satin Rick May 610.647.9115 x 102 4/28/2008
390	Metal Locker 10 51 13 (10500)	• Employee Dining - Lockers - New Build Only	Manufacturer: Model: Color: Contact: Phone: Revision Date:	Republic Storage Systems Company Standard Lockers 50 Gray Technical Assistance 800.477.1255 4/28/2008
	Metal Locker 10 51 13 (10500)	• Employee Dining - Lockers	Manufacturer: Model: Color: Revision Date	Hadrian Manufacturing, Inc. Emporer Locker System Satin Nickel 4/28/2008
	Metal Locker 10 51 13 (10500)	• Employee Dining - Lockers	Manufacturer: Model: Color: Revision Date	Penco Products, Inc. Vanguard Lockers Satin Nickel 4/28/2008
	Metal Locker 10 51 13 (10500)	• Employee Dining - Lockers	Manufacturer: Model: Color: Revision Date:	Lyon Workspace Products Industrial Satin Nickel 4/28/2008

Finish #	Material Spec / X-ref	Location	Description	
391	Door Hardware 08 71 00 (08710)	• Guestrooms - Doors	Comments: Revision Date:	See Design Guide Project Manual Master, Section 08 71 00, for Manufacturer, Model & Finish Specifications 4/28/2008
	Door Hardware 08 71 00 (08710)	• Back of House - Doors - • Public Space - Doors	Comments: Revision Date:	See Design Guide Project Manual Master, Section 08 71 00, for Manufacturer, Model & Finish Specifications 4/28/2008
	Door Hardware 08 71 00 (08710)	• Back of House - Doors - • Public Space - Doors	Comments: Revision Date:	See Design Guide Project Manual Master, Section 08 71 00, for Manufacturer, Model & Finish Specifications 4/28/2008
LBE-393	Decorative Acrylic Resin Panels 06 64 00 (06600)	• Market Casework	Manufacturer: Product: Pattern: Finish: Comments: Contact: Phone:	3form, Inc. Resin Panel Trace Bone polished Gauge: 3/8" Susan Studer 859.653.4069
LBE-397	Tile 09 30 00 (09310) Option 1	• Public Restrooms • Coffee Station • Bar • Reception Front	Manufacturer: Product: Color: Size(HxWxD): Comments: Contact: Phone:	American Olean Smokey Ballad VA86 Gloss 1-3/8” x 5/8” Linda Gundling 614.846.0214
	Tile Grout 09 30 00 (09310)	• Public Restrooms • Coffee Station • Bar • Reception Front	Manufacturer: Model: Color: Size(HxWxD): Contact: Phone:	Laticrete International, Inc Spectra Lock Epoxy Grout 90 Light Pewter 1/8" Joint Width Eric Pucilowski 800.243.4788 x 520

Finish #	Material Spec / X-ref	Location	Description
LBE-399	Decorative Acrylic Resin Panels 06 64 00 (06600)	• Lobby -Market Wall	Manufacturer: 3form, Inc. Product: Resin Panel Pattern: Hush Lichen Finish: Sandstone Thickness: 1/4” Comment: Contact: Susan Studer Phone: 859.653.4069
LBE-399A	Decorative Acrylic Resin Panels 06 64 00 (06600)	• Lobby -Elevator wall	Manufacturer: 3form, Inc. Product: Resin Panel Pattern: Hush Masala Finish: Sandstone Thickness: 1/4” Comment: Contact: Susan Studer Phone: 859.653.4069
LBE-400	Paint 09 90 00 (09900)	• "The Market" • Buffet • Business Library • Corridor - Gypsum Ceiling • Elevator - Machine Room • Great Room (See Finish Schedule for Soffit accent Color Locations) • Guest Laundry • Guestrooms - Ceiling • Janitor Closet • Maintenance Room • Public Restrooms - Men's - Women's • Stairwells - Ceiling • Pool Vestibule • Storage - Typical • Vending • Workroom - Closet • Network zone • Entry Vestibule • Fitness • HouseKeeping Office • Laundry and Linen Storage • Bar storage • Bag storage • Bar • Electrical / OCV • Storage • Lounge	Manufacturer: Sherwin-Williams Co. Color: SW 6364 Eggwhite Finish: Flat Contact: Rick May Phone: 610.647.9115 x 102
LBE-404	Paint 09 90 00 (09900)	• Pool – Indoor • Pool - Equipment Room	Manufacturer: Sherwin-Williams Co. Product: Water Based Acrylic Epoxy Color: Finish SW 6364 Eggwhite Comments: Refer to Design Guide Project Manual for Specifications Finish: texturi3, or sto-deco coat Contact: Rick May Phone: 610.647.9115 x 102

Finish #	Material Spec / X-ref	Location	Description	
406	Paint 09 90 00 (09900)	• Guestroom Bath	Manufacturer: Color: Finish: Contact: Phone: Revision Date:	Sherwin-Williams Co. SW7007 Ceiling Bright White Semi Gloss Rick May 610.647.9115 x 102 4/28/2008
LBE-411	Paint 09 90 00 (09900)	• Lounge - ORB Gypsum @ Focal Fixture	Manufacturer: Color: Finish: Contact: Phone:	Scuffmaster Sherwin Williams SW 6364 Eggwhite Pearlescent Stephanie Segal 800. 543.0412
LBE-412	Paint 09 90 00 (09900)	• Communal Circle • Reception Soffit • Meeting Room and Board Room soffits	Manufacturer: Color: Finish: Contact: Phone:	Sherwin-Williams Co SW 6108 Latte Satin Rick May 610.647.9115 x 10
420	Acoustical Ceiling Tiles 09 51 23 (09512)	• Guestroom Corridor - New Build Only • Fitness center • Back of House Corridor • Meeting Room • Board Room	Manufacturer: Model: Color: Size(HxWxD): Thickness: Edge: Contact: Phone:	Armstrong World Industries, Inc. - Ceilings Ultima Vector # 1920 Standard White 2' x 2' 3/4” Vector with texture fi nish Bree Dever 717.393.4325
	Acoustical Ceiling Tiles Grid 09 51 23 (09512	• Guestroom Corridor - New Build Only • Fitness center • Back of House Corridor • Meeting Room • Board Room	Manufacturer: Product: Model: Color: Size(HxWxD): Comments: Contact: Phone:	Armstrong World Industries, Inc. - Ceiling Suspended Acoustical Tile Grid Prelude XL 15/16” exposed tee Standard White See Comments Refer to Design Guide Project Manual Master Main runners # 7300 White, Cross runners # XL-7348, XL-7328 Bree Dever 717.393.4325

Finish #	Material Spec / X-ref	Location	Description	
LBE-420A	Axiom Trim for ceiling 09 54 29	• Trim for Wood ceiling LBE-421B at lounge and great room	Manufacturer: Product: Color: Size(HxWxD): Comments: Contact: Phone:	Armstrong Axiom Vector AX2VESTR Silver Satin (SA) 2” Straight 120 x ¾ x 2” Install upside down for flexibility with curves Monty Gillespie 513-309-1495
LBE-421A	Wood Acoustic Ceiling tile 09 54 29	• Great Room -Communal circle	Manufacturer: Product: Style: Color: Size(HxWxD): Comments: Contact: Phone:	Armstrong Woodworks Access Radial Panel 6006 Perforation Natural Variations Light Cherry Custom size and layout pattern Grid to be painted black with acoustical backing Monty Gillespie 513-309-1495
LBE-421B	Wood Acoustic Ceiling tile 09 54 29	• Great Room -Lounge Area	Manufacturer: Product: Style: Color: Size(HxWxD): Thickness: Comments: Contact: Phone:	Armstrong WoodWorks Vector 2x2 6006 Perforation Natural Variations Light Cherry 24” x 24” 3/4” Grid to be painted black, use Axiom trim at edge, with acoustical backing Monty Gillespie 513-309-1495
422	Acoustical Ceiling Tiles 09 51 23 (09512)	• Administrative Area - Work Area • Employee Dining • Employee Toilet • Building Engineer Office • Storage	Manufacturer: Model: Color: Size(HxWxD): Thickness: Edge: Contact: Phone:	Armstrong World Industries, Inc. - Ceilings Dune #1772, NF Standard White 2' x 2' 5/8" Square Lay-In Bree Dever 717.393.4325
	Acoustical Ceiling Tiles Grid 09 51 23 (09512)	• Administrative Area - Work Area • Employee Dining • Employee Toil	Manufacturer: Product: Model: Color: Size HxWxD): Thickness: Comments: Contact: Phone:	Armstrong World Industries, Inc. - Ceilings Suspended Acoustical Tile Grid Prelude 7300 Series or prelude 15/16” Standard White See Comments 15/16" Refer to Design Guide Project Manual Master Bree Dever 717.393.4325

Finish #	Material Spec / X-ref	Location	Description	
LBE-422A	Acoustical Ceiling Tiles 09 51 23 (09512)	• Food Prep	Manufacturer: Model: Color: Size(HxWxD): Thickness: Edge:	Armstrong World Industries, Inc. - Ceilings Clean Room VL, Item No 870, Unperforated Standard White 2' x 2' 5/8" Square Lay-In
	Acoustical Ceiling Tiles Grid 09 51 23 (09512)	• Food Prep	Manufacturer: Product: Model: Color: Size(HxWxD): Thickness: Comments: Contact: Phone:	Armstrong World Industries, Inc. - Ceilings Main Runners Item No. HD8201(includes Alum. G-60 cap) Prelude Plus XL Fire Guard Standard White See Comments 15/16" Refer to Design Guide Project Manual Master Bree Dever 717.393.4325
LBE-422B	Acoustical Ceiling Tiles 09 51 23 (09512)	• Laundry / Dryer Room	Manufacturer: Model: Color: Size(HxWxD): Thickness: Edge	Armstrong World Industries, Inc. - Ceilings Clean Room VL, Item No 869, Perforated Standard White 2' x 2' 5/8" Square Lay-In
	Acoustical Ceiling Tiles Grid 09 51 23 (09512)	• Laundry / Dryer Room	Manufacturer: Product: Model: Color: Size(HxWxD): Thickness: Comments: Contact: Phone:	Armstrong World Industries, Inc. - Ceilings AL Prelude Plux XL Main Runners Item No. AL7200 White 15/16" Refer to Design Guide Project Manual Master Bree Dever 717.393.4325
LBE-423	Acoustical Ceiling Tiles 09 51 23 (09512)	• Buffet ceiling	Manufacturer: Color: Model: Size(HxWxD): Thickness: Edge: Contact: Phone:	Armstrong World Industries, Inc. Ceilings White, fine texture Health Zone Ultima, 1936 24” x 24” 3/4” 9/16” Beveled Tegular Bree Dever 717.393.4325

Finish #	Material Spec / X-ref	Location	Description	
510	Stainless Steel 14 24 23 (14240)	• Elevator - Cabs - Base - Interior Car Doors - Return Walls - Front • Car entrance - columns Car Transom Handrails rear wall Direction signs Hall buttons Hoistway door frames Panels- all fl oors Sight guards Elevator base	Manufacturer: Product: Finish:	Refer to Design Guide Project Manual Master for Specifications Stainless Steel No. 04 Brushed
512	Aluminum 14 24 23 (14240)	• Elevator - Cabs - Car Sills, Hoistway & Entrance Sills -	Manufacturer: Product: Color: Finish:	Refer to Design Guide Project Manual Master for Specifications Aluminum Natural Natural
LBE-520	Plastic Laminate 14 24 23 (14240)	• Elevator - Cabs - Walls - Rear and Side	Manufacturer: Color: FSR: Contact: Phone:	WilsonArt International, Inc. 50 Leslie Reed 614.893.6853
530	Paint 14 24 23 (14240)	• Elevator - Cabs - Walls: Rear & Side, Behind Plastic Laminate Panels	Manufacturer: Color: Revision Date:	Refer to Design Guide Project Manual Master for Stainless Steel 8/7/2009
540	Stainless Steel 14 24 23 (14240)	• Elevator - Cabs - Ceilings	Manufacturer: Product: Model: Finish: Size(HxWxD): Comments: Revision Date:	Refer to Design Guide Project Manual Master for Specifications Concealed Frame Suspended Stainless Steel Ceiling Schindler Model SC08 or approved substitution No. 04 Brushed 7'-4" A.F.F. Min Lighting: 9 Downlights - Compact Fluorescent 4/28/2008
LBE-543	**Wood Trim**	• Wood Trim @ ceilings in meeting and board rooms (4”)	Manufacturer: Product: Contact: Phone:	

00 31 13.45 - EXTERIOR FINISH INDEX

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section shall be used in conjunction with the Drawings and with related Sections of the Specifications.

PART 2 PRODUCTS

2.01 GENERAL

A. Attached is the Exterior Finish Index. Refer to individual Specification Sections for further information on listed products.

PART 3 EXECUTION

Not Used

Note: See attached copy of the current Exterior Finish Index after this Section.

END OF SECTION

Revision Log

SpringHill Suites - Exterior Finish Index (Gen 4)

Revised: November 05, 2010

Note: All substitutions for colors, where allowed, are to be approved by Architect, Owner's Rep and Marriott.

PLAN MARK	SPEC. SECTION	MATERIAL	MANUF.	FINISH DESCRIPTION
	04 73 00	**Manufactured Stone Masonry**	**Cultured Stone**	**Pattern: Pro-Fit Ledgestone** **Color E6: Platinum Pro-Fit Ledgestone (PF-8017)**
			Eldorado Stone	**Pattern: Match pattern listed above, Selection to be approved by Architect** **Color E6: Match color listed above, Selection to be approved by Architect**
	07 24 00 / 07 24 19	**Exterior Insulation & Finish System (Standard)**	**STO**	**Color E1: Match Sherwin Williams Color SW6062 "Rugged Brown"** **Texture: Fine**
			STO	**Color E2: Match Sherwin Williams Color SW7542 "Naturel"** **Texture: Fine**
			STO	**Color E3: Match Sherwin Williams Color SW7046 "Anonymous"** **Texture: Fine**
			Senergy	**Color E1: Match Sherwin Williams Color SW6062 "Rugged Brown"** **Texture: Fine**
			Senergy	**Color E2: Match Sherwin Williams Color SW7542 "Naturel"** **Texture: Fine**
			Senergy	**Color E3: Match Sherwin Williams Color SW7046 "Anonymous"** **Texture: Fine**
PLAN MARK	**SPEC. SECTION**	**MATERIAL**	**MANUF.**	**FINISH DESCRIPTION**
	07 24 00 / 07 24 19	**Exterior Insulation & Finish System (Standard) - Continued**	**Dryvit**	**Color E1: Match Sherwin Williams Color SW6062 "Rugged Brown"** **Texture: Fine**
			Dryvit	**Color E2: Match Sherwin Williams Color SW7542 "Naturel"** **Texture: Fine**
			Dryvit	**Color E3: Match Sherwin Williams Color SW7046 "Anonymous"** **Texture: Fine**

PLAN MARK	SPEC. SECTION	MATERIAL	MANUF.	FINISH DESCRIPTION
	07 42 13	**Metal Plate Wall Panels**		**Color E5: To Match Firestone Una-Clad "Aluminum Slate Gray", as approved by Architect**
				Color E6: To Match Firestone Una-Clad "Silver Metallic", as approved by Architect

PLAN MARK	SPEC. SECTION	MATERIAL	MANUF.	FINISH DESCRIPTION
	07 62 00	Copings & Gravel Stops		Color: To Match Adjacent Wall Color, as approved by Marriott Representative
	07 92 00	Joint Sealants Control Joints		Color: To Match Adjacent Wall Color, as approved by Marriott Representative
	08 41 13	Aluminum-Framed Entrances and Storefronts		**Color E4:** Clear Anodized
	08 42 29	Automatic Entrance Doors		**Color E4:** Clear Anodized
	08 51 13	Aluminum Windows		**Color E4:** Clear Anodized
	08 80 00	Glass Color		Color: Clear, unless noted otherwise.
	09 96 00	Special Coatings Pipe Bollards		Color: To be selected by Architect
	23 81 13.13	Exterior Louvers (PTAC) (Integral with Window Frame)		**Color E4:** Clear Anodized
	32 13 13	Imprinted Concrete Paving	Bomanite	Pattern: To be selected by Architect Color: To be selected by Architect
		Porte Cochere Patio	Sundek	Pattern: To be selected by Architect Color: To be selected by Architect

PLAN MARK	SPEC. SECTION	MATERIAL	MANUF.	FINISH DESCRIPTION
Note: Select either Imprinted Concrete Paving or Concrete Pavers for Porte Cochere and/or Patios. Delete Paving not used.				
	32 14 13	Concrete Pavers Porte Cochere Patio		Size: As shown on Landscape drawings Pattern: As shown on Landscape drawings Color: As shown on Landscape drawings

Module 14

Fire Protection & Life Safety





January 2010

Contents

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The technical requirements of Module 14 have not changed since the update of January 2010

Module Organization

- This Module is a part of an integrated series of 17 Modules.
- Coordination with information from other Modules is required.
- The reference symbol **<XX>** is used to indicate a Module reference that includes related information.

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14.1 General Requirements

A. Application:

1. Marriott's Fire Protection and Life Safety Design Standards govern all Marriott International Brands that are owned, managed or franchised properties.
2. The Marriott Fire Protection and Life Safety Design Standards include design standards, performance criteria, reference standards and life safety process verification that define a comprehensive fire protection program. Coordinate requirements with other Modules and in particular **<10>, <12>** and **<15>**.
3. Application of these Standards to a specific project requires a design analysis. For example, a project's qualification as either a low-rise or high-rise building will significantly affect the elements of a project's fire protection and life safety program.
4. When a Marriott property is integrated with or interconnected with another building, the building shall provide protection equal to the fire protection and life safety standards required for the Marriott property, as defined by Marriott Fire Protection on a case-by-case evaluation.

B. Systems: Provide the following functional systems in compliance with the listed performance criteria:

- Sprinkler / Standpipe System
- Fire Alarm
- Mechanical Smoke Control
- Kitchen Hood and Duct Fire Suppression
- Standby Power, Emergency Power and Lighting
- Central Control Station (Fire Command Room)
- Means of Egress

14.2 Definitions

A. Low-Rise Building: A building that does not qualify as a High-Rise Building as defined below. (C)

B. Low-Rise Building Smoke Control: See Section 14.8 for buildings more than 6 stories and special conditions.

C. High-Rise Building: A building where the floor of an occupiable story is greater than 23 m (75 ft.) above the lowest level of fire department access.

D. Back of House (BOH): Includes areas such as employee spaces, employee restrooms, laundry, offices, work areas, kitchen, storage areas, shops, etc.

14.3 Codes, References and Standards

A. Application: Current edition of associated references are the basis for Marriott's Fire Protection and Life Safety Design Standards and are applicable to all Marriott managed, owned and franchised properties.

B. National Fire Protection Association (NFPA) Standards: The Life Safety Code - NFPA 101 is the basis for Marriott's Fire Protection and Life Safety Design Standards. Compliance with NFPA 101 is required in addition to the codes required by the governing authority. Comply with the following:

NFPA 101:	Life Safety Code (except Chapter 43 and "horizontal exits" are not permitted)
NFPA 13:	Standards for the Installation of Sprinkler Systems
NFPA 14:	Standpipe Systems
NFPA 17A:	Wet Chemical Extinguishing Systems
NFPA 20:	Centrifugal Fire Pumps
NFPA 24:	Private Fire Service Mains
NFPA 30:	Flammable and Combustible Liquids Code
NFPA 70:	National Electric Code
NFPA 72:	National Fire Alarm Code
NFPA 80:	Fire Doors and Fire Windows
NFPA 82:	Incinerators, Waste and Linen Handling Systems and Equipment
NFPA 88A:	Parking Structures
NFPA 90A:	Installation of Air-Conditioning and Ventilation Systems
NFPA 92A, 92B:	Smoke Control Systems
NFPA 96:	Ventilation and Fire Protection of Commercial Cooking Operations
NFPA 110:	Emergency and Standby Power Systems
NFPA 750:	Standard on Water Mist Fire Protection Systems
NFPA 1142:	Water Supplies for Suburban and Rural Fire Fighting

C. Underwriters Laboratories (UL) Listing: Provide UL listed materials, appliances and equipment.

D. Governing Regulations: Comply with governing laws, codes, regulations and Marriott Design Standards, including Marriott requirements that exceed or are more stringent than governing laws, codes and regulations. If governing requirements conflict with Marriott's Design Standards, contact Marriott Fire Protection for resolution.

E. Americans with Disabilities Act (ADA): Comply with Life Safety requirements. See the Design Standards for general accessibility requirements.

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F. Tents and Temporary Structures: Comply with Marriott's policy titled "Tents and Temporary Structures" as published on the Marriott Global Source.

14.4 Systems Testing

A. Application: Before a property is occupied, the fire protection and life safety systems shall be fully operational, contractor tested and approval obtained from Marriott Fire Protection.

In order to obtain Marriott's approval, the fire protection and life safety systems shall be operated by the contractor under simulated emergency conditions in the presence of Marriott Fire Protection personnel and the contractor shall demonstrate compliance with Marriott's Standards.

B. Automatic Sprinkler / Standpipe System (Section 14.6):

1. Contractor shall flush and pressure test system.
2. Contractor shall demonstrate compliance by testing water flow and tamper switches.
3. Fire pump shall be tested and certified by the manufacturer.
4. Underground mains flushed and tested.

C. Fire Alarm (Section 14.7):

1. Contractor shall pretest and operate system without trouble lights exhibited.
2. Contractor shall demonstrate compliance by testing all devices and appliances, auxiliary functions, initiating alarms, and verifying that proper point address and supervision appear on alarm panel.

D. Mechanical Smoke Control (Section 14.8):

1. Prior to testing smoke control systems, HVAC systems shall be contractor tested and balanced. Test and balance report must be available.
2. Public area, atrium and guestroom corridor smoke exhaust, and stairwell pressurization systems shall be operational and tested to clear "cold smoke" so that exit signs are visible within 10 minutes of activation without smoke migration to other areas.

E. Kitchen Hood and Duct Fire Suppression (Section 14.9):

1. Contractor shall pretest all coordinated components by activation of kitchen hood and duct flow switch or suppression system control unit.
2. Contractor shall demonstrate compliance by operating initiating devices, activating coordinated alarms, gas, electric and hood supply air fan shut off.

F. Emergency Electrical Systems (Section 14.10):

1. Generator shall be operational and tested to automatically activate upon loss of normal incoming power and to provide standby and emergency service to operate emergency lighting and specified systems.
2. Battery standby power and UPS systems providing emergency power and lighting shall be fully operational.

G. Central Control Station (Fire Command Room) (Section 14.11): Panels, indicators, controls and systems shall be operational, tested and approved.

H. Means of Egress (Section 14.12): Facilities for means of egress shall be operational and unobstructed.

14.5 Submittals

A. Submittal Requirements: Prior to installation of systems, submit one copy of drawings, plus accompanying materials and documentation of the following for review and approval to:

1. Marriott Fire Protection:
   - **a.** Drawings Scale: Not less than the following:
     - International Projects: 1:100 scale.
     - Domestic (U.S. / Canada): ⅛ inch = 1 ft. scale.
   - **b.** Floor Plans: Show exiting and occupant load diagrams, and fire resistance ratings.
   - **c.** Fire Alarm: System diagrams, shop drawings, equipment product sheets, voltage drop and battery calculations and sequence of operation matrix.
   - **d.** Automatic Sprinkler & Standpipe: System shop drawings, hydraulic calculations and equipment product sheets.
   - **e.** Emergency Power: Plans for emergency lighting and exit signs, and information on the emergency power provided.
   - **f.** Smoke Control: System shop drawings, riser diagrams and calculations (space volumes, air changes, fan and equipment flow capacities, and locations).
2. Zurich Services Corporation - Marriott Managed Properties Only:
   - **a.** Automatic Sprinkler & Standpipe: System shop drawings, hydraulic calculations and equipment product sheets.
   - **b.** Construction Drawings: Set of construction (contract) drawings.

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B. Mailing Addresses:

1. Marriott Fire Protection: Marriott International, Inc.; Marriott Fire Protection, Dept. 52/924.36; 10400 Fernwood Road; Bethesda, MD 20817
2. Zurich Services Corporation, Mr. Dale Seemans, 611 Nemours Ln., Woods of Louviers, Newark, DE 19711.

14.6 Automatic Sprinkler / Standpipe System

A. System Application: Provide Marriott properties with a complete hydraulically designed combination, automatic sprinkler / standpipe system or "HI-FOG" water mist system and standpipe system, zoned by floor.

1. Building Footprint: Sprinkler building areas within building "footprint", including canopies required by NFPA 13.
2. Parking Structures: Provide sprinkler protection, unless greater than 50% of perimeter is open to exterior air and not under hotel footprint.
3. Ballrooms & Exhibit Halls: Design the sprinkler system in compliance with Ordinary Hazard Group 1.
4. Ancillary Buildings: Provide sprinkler protection for ancillary buildings that are occupied, have a significant content value or have a significant impact on business interruption if damaged as determined by Marriott Fire Protection review. Examples include:
   - Golf Clubhouse
   - Golf Maintenance Building
   - Golf Car Storage Building
   - Occupied thatched roof buildings
   - Pool buildings with lockers or F&B

   Small structures (less than 9.3 m^2 (100 sq. ft.)) located more than 9 m (30 ft.) from other buildings do not require sprinkler protection. Examples include:
   - Gazebos
   - Golf Comfort Stations
   - Golf Weather Protection Stations
   - Beach Shade Structures
5. Utility Spaces: Provide complete sprinkler protection in electrical, mechanical, telephone and computer rooms.
6. Loading Docks and Truck Bays: Provide sprinkler protection. If subject to freezing, provide dry pipe system.
7. Freezer and Cooler Boxes: Protect with dry type sprinklers supplied from area wet pipe sprinkler system.

8. Guestroom Bathrooms: Sprinklers are not required if bathroom is less than 5.10 m^2 (55 sq. ft.). Regardless of bathroom area, sprinklers are required when combustible tubs, or shower and tub surrounds (plastic / fiberglass) enclosures are provided.
9. Closets & Pantries: Sprinklers are not required in clothes closets, linen closets and pantries within guestrooms where the area does not exceed 2.2 m^2 (24 sq. ft.) and where the least dimension does not exceed 0.9 m (3 ft.). Closets and pantries with washer, dryer, water heater, mechanical or electrical equipment require sprinklers.
10. Coastal Areas: If the project is within 16 km (10 miles) of the coastline, provide exterior galvanized pipe and fittings with corrosion resistant sprinklers for wet pipe and dry pipe sprinkler systems in unconditioned spaces.

B. Design Requirements:

1. Standards: NFPA 13 (not NFPA 13R), 14, 1142 & 20.
2. Water Source: Perform flow tests and document. Provide dependable source of water quantity and pressure from municipal water main or from on site cistern or tanks if municipal water is not available.
3. Safety Factor: Provide a 10% hydraulic safety factor up to a maximum of 0.7 bar (10 psi).
4. Control Valves: Provide a supervisory signal initiating device (tamper switch) for each control valve.
5. Pressure Reducing Valves: In order to minimize adjustment and maintenance, design system within maximum pressure of 12 bar (175 psi) without use of pressure reducing valves. If pressure reducing valves are necessary obtain approval from Marriott Fire Protection.
6. Water Reservoir: Where fire protection and domestic water systems share a common water reservoir (tank, cistern, etc.), locate the domestic water connection at the reservoir above the water level reserved for the fire system to avoid depleting the fire system by domestic use.
7. Fire Pumps: Locate fire pump drivers, fire pumps, fire pump controllers and fire pump power supplies (normal and standby) above the 100 year flood elevation and above the maximum anticipated hurricane storm surge elevations.
8. Zoning: Zone each floor / story separately at a minimum.
   a. Low-Rise Buildings: Provide each zone with a control valve, flow switch and tamper switch monitored by the fire alarm system.
   b. High-Rise Buildings: Connect guestroom zone sprinkler piping to 2 risers at each floor with a control valve, flow switch and tamper switch at each riser.

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See example "looped" riser and inspector test drain assembly detail at end of this Module.

c. Attic Spaces: Provide dedicated zone for attic spaces, separate from floor below.

C. **Wet Pipe Sprinkler Systems:** Provide for habitable spaces such as guestrooms, guestroom corridors, restaurants, ballrooms, meeting rooms, public and back-of-house areas. Route wet pipes in heated spaces. Heat tape and insulation is not considered "freeze protected" and is not acceptable.

D. **Dry Pipe Sprinkler Systems:** Provide in attic and unheated areas to avoid the possibility of freezing.

1. Dry type sprinklers supplied from the wet pipe sprinkler system may be provided in small unheated areas.
2. Antifreeze (liquid) systems are not permitted.
3. Use internally galvanized steel pipe.
4. Design for dry valve trip test that provides water to the remote inspector test and drain assembly within 60 seconds after activation of inspector's test valve.
5. Provide system with valve, trim, tank mounted compressor, control and test valves, gauges, pressure and high / low air pressure switches and approved drains.

E. **Inspector's Test & Drain Assembly:**

1. Drain Pipe: Provide continuous hard pipe (steel or CPVC) to exterior at ground level in a location where discharge will not damage exterior pavement or landscaping.
2. Access: Visible and readily accessible in back-of-house area or stairwell (not in ceiling or behind access panels).
3. Location: Do not locate in finished areas (guestroom, guest corridor, etc.).
4. Low Rise Buildings: Locate at remote end of zone (not in guestrooms) with continuous hard pipe drain to exterior.
   a. See example detail at end of this Module.
   b. If building contains more than one remote end, install a valve and drain at each remote end.
5. High Rise Buildings:
   a. Guestroom Floors: Locate at each riser (looped system) or at remote end of zone, continuous hard pipe drain to exterior.
   b. Non-guestroom Floors: With one control valve, locate at remote end of zone, continuous hard pipe drain to exterior.
   c. If zone contains more than one remote end, install a valve and drain at each remote end.

F. Sprinklers: Fast response / quick response 57° to 77° C (135° to 170° F) throughout guest and public areas. Concealed (cover plate) sprinklers are not permitted. Regardless of sprinkler type or listing, provide 0.10 minimum discharge density for light hazard areas. Exceptions where listed for a particular application are as follows:

Room / Space	Sprinkler Type	Temp. Rating
Attic Systems	Quick Response - ventilated Quick Response - unventilated	100° C (212° F) 141° C (286° F)
Dry Pipe Systems	Quick Response - ventilated (unoccupied spaces) Quick Response - unventilated	100° C (212° F) 141° C (286° F)
Mechanical / Electrical	Quick Response	68° to 77° C (155° to 170° F)
Balcony (combustible)	Quick Response - corrosion resistant, dry, side wall	100° C (212° F)
Porches	Quick Response - corrosion resistant, dry, side wall	100° C (212° F)
Parking Structures	Quick Response	68° to 77° C (155° to 170° F)
Elevator Machinery	Quick Response	100° C (212° F)
Swimming Pools (indoor)	Quick Response - corrosion resistant	68° to 77° C (155° to 170° F)
Sauna / Steam Rooms Laundry Dryer Plenum	Quick Response - corrosion resistant	141° C (286° F)
Walk-in Coolers / Freezers	Quick Response - dry pendant	74° C (165° F)

G. Sprinkler Coordination:

1. Install sprinklers with the manufacturer's minimum allowable projection from the wall or ceiling.
2. Coordinate locations of sprinklers at guestrooms and public areas to avoid location conflicts (such as crown moldings, HVAC grilles, ceiling fans).
3. In corridor ceilings, generally, position sprinklers along centerline of corridor width.
4. In ceilings with acoustical tiles, position sprinklers in center of tiles.

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14.7 Fire Alarm

A. Requirements: Provide entire building with a central fire alarm system from Marriott's approved vendors. See the Fire Alarm System Sequence Matrix in this Module. Coordinate with **<15>**.

1. Standard: NFPA 72.
2. System: Provide a fully point addressable intelligent system (all alarm initiating and supervisory devices individually addressable) in all buildings.
3. Supervising Station Service: Provide a remote supervising station service for Marriott CFRST hotels and where determined by Marriott Fire Protection, that receives and records operation signals of the circuits and devices, and notifies the local fire department when a general alarm is activated.
4. Campus Style Sites: Provide point addressable intelligent networking that reports to the continuously attended property location.
5. Testing: Provide the following at the Fire Alarm Control Panel (FACP).
   a. Individual disconnect switches / buttons for testing purposes:
      - Audible appliances and visual strobes (sounder base must function upon guestroom smoke sensor activation)
      - Door hold open mechanisms
      - Elevator recall
      - Air handlers
   b. Alarm sensitivity testing capability at FACP.
6. Exterior & Unconditioned Areas: Provide NEMA 4X rated devices and appliances (weatherproof, corrosion resistant) listed for exterior exposure.

B. System Smoke Sensors (Detectors):

1. Guestrooms, Suite Rooms and other Sleeping Units: Provide 24 Volt system smoke sensors with sounder bases to meet the following:
   a. Photoelectric type sensor.
   b. Sounder Base: Provide minimum audible alarm of 85 dBA at 3 m (10 ft.); minimum of 75 dBA "at the pillow".
   c. Activation of room system smoke sensor to immediately and automatically sound an alarm (three pulse temporal pattern) within the room of incident.
   d. System smoke sensor normal and emergency power is provided by the FACP.

e. In suites and other mixed sleeping spaces, provide the following:
   - System smoke sensors in each separate sleeping room, living rooms convertible to sleeping and areas providing access to the corridor doorway.
   - Multiple sensor sounder bases located within the same suite or unit shall activate at the same time.

f. To minimize unwanted alarms, avoid locating smoke sensors near the kitchen or bathrooms.

2. Public Areas, Corridor and Back of House Areas: Provide system smoke sensors where:
   a. Required by governing code.
   b. Smoke exhaust is required in compliance with the other requirements of this Module.
3. Duct System Smoke Sensors: Provide duct system smoke sensors as required by NFPA 101 Life Safety Code. Provide remote test switch and indicator light accessible from floor level.

C. **Carbon Monoxide (CO) Detectors:** Install CO detectors with sounders connected to the FACP and annunciated as a supervisory signal.
1. General: Provide in rooms and areas containing fuel burning appliances and equipment.
2. Fireplaces: Provide detector in guestrooms and public spaces containing fuel burning (including wood) fireplaces.

D. **Manual Pull Stations:** At Reception Desk only, unless required in other locations by applicable codes.

E. **Firefighter Communication Systems:** Comply with governing code requirements.

F. **Alarm Notification Appliances:** Provide audible notification appliances (speakers, mini-horns, horns, or sounder bases of system smoke sensors listed for general and local evacuation) and visual notification strobe lights in locations according to the following:
1. Guestroom, Suite Rooms & other Sleeping Spaces: Provide audible appliances in each sleeping room. In properties with separate multiple sleeping spaces, such as suites and apartments, provide in each sleeping room.
2. ADA Accessible & Hearing Accessible Designated Guestrooms, Suites, or Apartments: Provide audible alarm appliances and visual alarm strobes.

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a. Arrange strobes to flash in each room or area, within direct line of sight from bed pillows, and bathroom when the following occurs:
   - System smoke sensors and (CO) detectors in rooms or units activate.
   - Building fire alarm notification alarms activate.

b. Strobe Light Rating:
   - 177 candela - within 61 cm (24 inches) from the ceiling.
   - 110 candela - more than 61 cm (24 inches) from the ceiling.

3. Public Areas, Corridors & BOH: Provide audible and visual notification appliances.

G. Emergency Occupant Notification:

1. Low-Rise Buildings: Automatic alert tone (three pulse temporal pattern).
2. High-Rise Buildings & Assembly Spaces Over 300 Occupants: Continuous cycle alert tone and automatic prerecorded voice message with manual voice communication override.

H. Annunciator: Provide point address to indicate floor, specific location, device and type of alarm. Provide annunciators in areas monitored 24 hours by property employees (Security, AYS, PABX room, Reception Desk) in locations approved by Marriott and governing authority.

I. Door Hold Open Mechanism: Automatically release doors in affected zone when an alarm is activated. See "Means of Egress" section in this Module.

14.8 Mechanical Smoke Control <15>

A. Application: Provide the following mechanical smoke control systems:

- Smoke exhaust - public areas
- Smoke exhaust - guestroom corridors
- Stair pressurization

B. Standards: NFPA 92A and 92B.

C. Building Configuration:

1. Low-Rise Buildings: Mechanical smoke control is required in buildings more than 6 stories, regardless of height. Smoke control may also be required in other low-rise buildings if Marriott Fire Protection judges that fire department access is limited or exiting is not adequate.
2. High-Rise Buildings: Mechanical smoke control is required.
3. Atrium: Consult Marriott Fire Protection for atrium smoke control requirements.

D. Locations:

1. Public Areas: Provide mechanical smoke exhaust in lobby, atriums, restaurants, pre-function areas, ballrooms, meeting rooms greater than 32.5 m² (350 sq. ft.) and exhibition halls. Each area is a separate smoke control zone. Activate automatically by area smoke detectors.
2. Guestroom Corridors: Provide mechanical smoke exhaust. Activate automatically by area smoke sensors and by floor water flow switches (independent of each other).
3. Stair Pressurization: Mechanically pressurize stair enclosures in compliance with NFPA 101.
4. See “Fire Alarm System Sequence Matrix” at end of this Module for sequence of operation.
5. Manual Override: Include manual override controls at the Central Control Station (Fire Command Room) or designated area.

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14.9 Kitchen Hood & Duct Fire Suppression

A. Application: Provide fire suppression system for kitchen hoods and ducts in food production kitchens **<10> <15>**.

B. Suppression System: Provide Ansul "Piranha" dual agent suppression system or "HI-FOG" water mist system.

C. Other Functions: Provide kitchen hood and duct system flow switch or control units of fire suppression system to:

- send fire alarm signal to FACP.
- activate electric or mechanical solenoid to shutoff gas to affected cooking lines.
- trip breaker to shut off all electric to cooking appliances and lighting.
- shut off kitchen hood makeup air handler.

14.10 Emergency Electrical Systems <15>

A. Standards: NFPA 110, NFPA 70 (NEC), NFPA 101

B. Requirements: Emergency electrical systems and standby power are required for emergency power and lighting, and to maintain property operation in the event of loss of normal incoming electrical service. Transfer from one power source to another must take no longer than 10 seconds. See Module **<15>** for backup and standby power loads.

C. Emergency Lighting: Provide emergency lighting for code required egress, property operations and safety, as follows:

- Exit signs
- Egress paths and stairs
- Exterior exit door discharge
- Meeting Rooms, Ballrooms, Exhibit Halls
- Restaurants, Lounges
- Public stairs and steps
- Telephone Equipment Room
- Mechanical, electrical and elevator rooms
- Public toilets
- Fire Pump / Sprinkler Riser Room
- Kitchens
- Laundry
- Reception Desk
- Employee Cafeteria / Breakroom
- Employees lockers and toilets
- Fitness Center
- Engineering / Maintenance Office
- Administrative Office area
- PABX & AYS Room
- Security Office

- Parking Structure
- Indoor Pool room
- Spa Treatment Rooms
- Fire Command Room (high-rise building)

14.11 Central Control Station (Fire Command Room)

A. High-Rise Buildings: Provide at a location approved by the governing authority. **<15>**

14.12 Means of Egress

A. Standards: Comply with NFPA 101, The Life Safety Code, except "horizontal exits" are not permitted.

B. Guestroom Areas Corridors: **<7>** Comply with the following:

1. Exits: 2 or more remote exits
2. Dead-End Corridor Limit: 15.24 m (50 ft.)
3. Common Path Limit: 15.24 m (50 ft.)

C. Assembly Spaces: **<3> <6>**

1. Occupant Load Factors:
   a. Ballrooms, Meeting Rooms & Exhibit Halls: 0.65 m² (7 sq. ft.) per occupant
   b. Restaurant, Lounges & Board Rooms: 1.4 m² (15 sq. ft.) per occupant
2. Egress Capacity Factors:
   a. Stairways: 7.6 mm (0.3 inch) width per person
   b. Doors, Level Components & Ramps: 5 mm (0.2 inch) width per person
3. Design Requirements:
   a. Dead-End Corridor Limit: 6.10 m (20 ft.) .
      - Common Path Limit: 6.10 m (20 ft.)
      - Hardware: Provide panic hardware on assembly occupancy doors and on doors in the paths of travel, where occupant loads are greater than 100 persons.
      - Occupants: Occupant loads greater than 50 persons, using the above occupant load factors, requires two or more remote exits. Distance between the nearest edges of remote exits is a minimum of one third the greatest diagonal dimension of the space.
      - Door Hold Open Mechanism: On entry doors (not BOH service doors) to assembly rooms **<6>** greater than 32.5 m² (350 sq. ft.), provide electro-magnetic door hold open mechanism connected to the fire alarm system and electrical service **<15>** to hold doors open and to automatically release doors when an alarm is activated.

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b. Operable Partitions: Doors in operable partitions do not qualify as exits.
c. Kitchen Areas: Egress paths through Kitchens do not qualify as exits.

D. Multi-Use Exits: Avoid sharing stairs and exit corridors with other properties (office, retail, residence, etc.). If unavoidable, submit and obtain approval from Marriott Fire Protection of alternate facilities that safeguard the property operational and security integrity. **<1>**

E. Exterior Exit Path: Provide the required width for the exit capacity but not less than 90 cm (3 ft.), hard surfaced walkway leading to a public way.

F. Evacuation Signage: **<GR>** Provide in guestrooms **<7>** and other rooms and spaces as directed by Marriott Fire Protection.

G. Exit Discharge: One half of all exits shall discharge directly to the building exterior.

H. Doors: Stair doors and exit doors shall not be locked from either side. Doors to the exterior must allow for exit access but may be designed to prevent entry from the exterior.

I. Stair Handrails: At a minimum, provide handrails on both sides of stairways. See Module **<16>**.

14.13 Facility Requirements

A. Fire Resistance Ratings: Fire resistance ratings of walls, doors, shafts, stair enclosures, floor / ceiling assemblies and flammability ratings of furnishing, carpeting, curtains and wall finishes shall comply with NFPA 101.

B. Operable Windows: **<16>** Where operable windows are utilized, provide windows with window manufacturer's safety stops integral with window frame to restrict opening to 10 cm (4 inch) maximum width.

1. See governing code for other restrictions.
2. Provide with manufacturer's "key" for maintenance.

C. Fireplaces: Obtain Marriott Fire Protection approval for custom fireplaces.

D. Linen & Trash Chutes: Comply with NFPA 82, NFPA 101 and NFPA 13.

1. Chute Vent: Provide (full size) a minimum of 90 cm (3 ft.) above the roof line.
2. Construction: Provide metal, prefabricated, manufactured chute within a fire rated shaft.
3. Loading Door: Protect chute openings with a fire rated loading door, located within a service opening room (vestibule).
4. Room Enclosure: Construct the service opening room (vestibule) with fire rated enclosure and door.
5. Sprinkler: Install a sprinkler above the top service opening of the chute, above the lowest service opening, and above service openings at alternate levels in buildings over two stories in height.

E. Elevators: See Module **<12>** for fire and emergency controls.

14.14 Example Diagrams

A. General: The following schematic diagrams are provided to illustrate the systems described in this Module.

1. Isometric of Typical Zoned Low-Rise Sprinkler System
2. Isometric of Typical "Looped" High-Rise Guestroom Tower Sprinkler System
3. Typical "Looped" High-Rise Guestroom Tower Sprinkler Riser Diagram
4. Fire Alarm System Sequence Matrix

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Isometric of Typical Zoned Low-Rise Sprinkler System

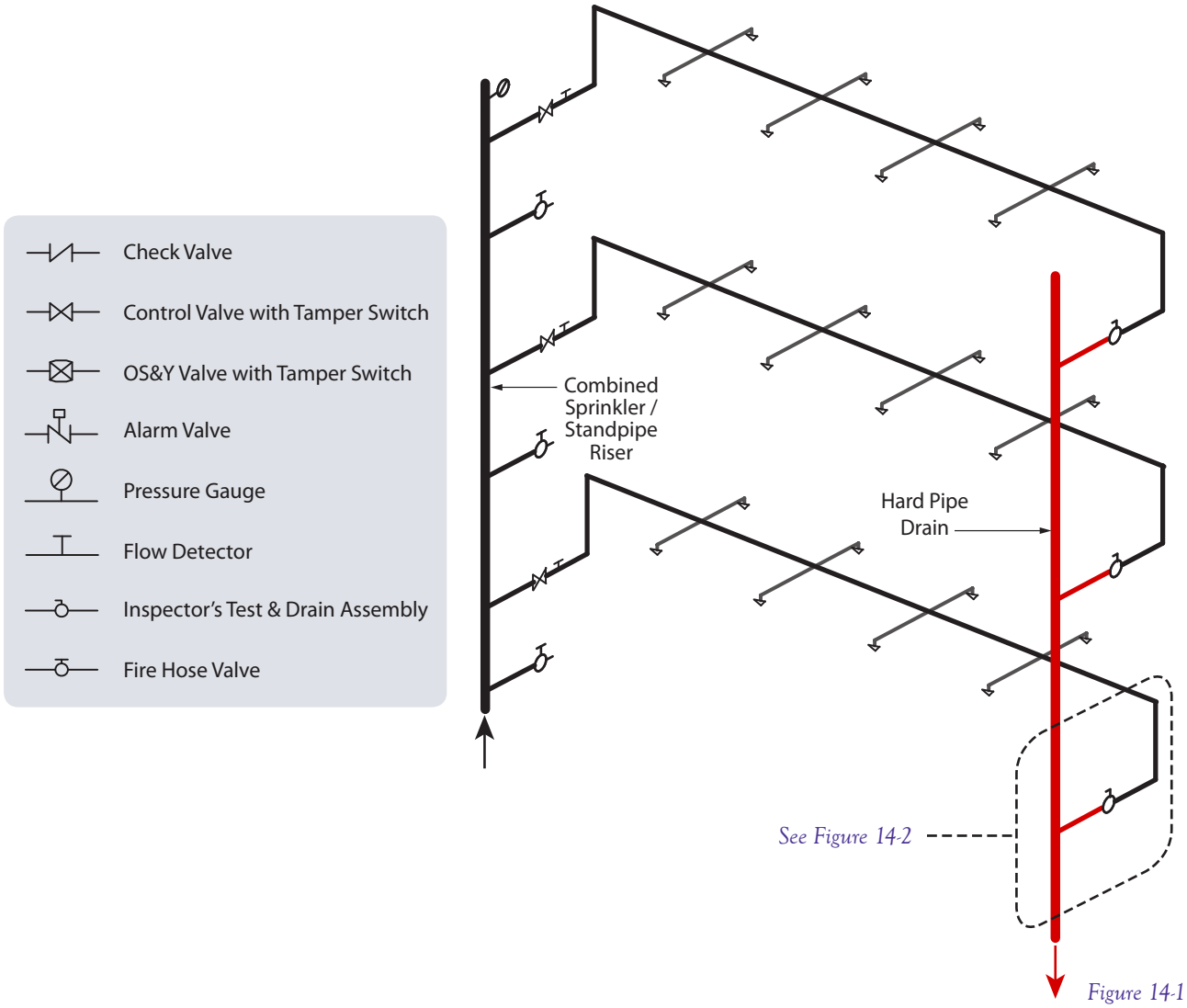


Figure 14-1

Detail: Inspector's Test & Drain Assembly

1. Hard pipe drain from floor above (steel or CPVC)
2. From end of remote branch line for each zone
3. Inspector sightglass
4. Inspector's test and drain assembly with 1.33 mm (½ inch) orifice in readily accessible location
5. Continuous hard pipe (steel or CPVC) to exterior
6. 45° El
7. Smooth bore corrosion resistant outlet

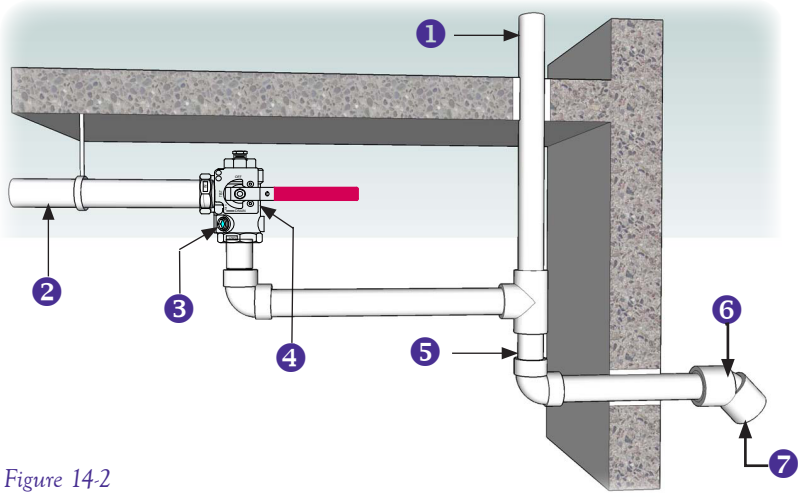


Figure 14-2

Isometric of Typical "Looped" High-Rise Guestroom Tower Sprinkler System

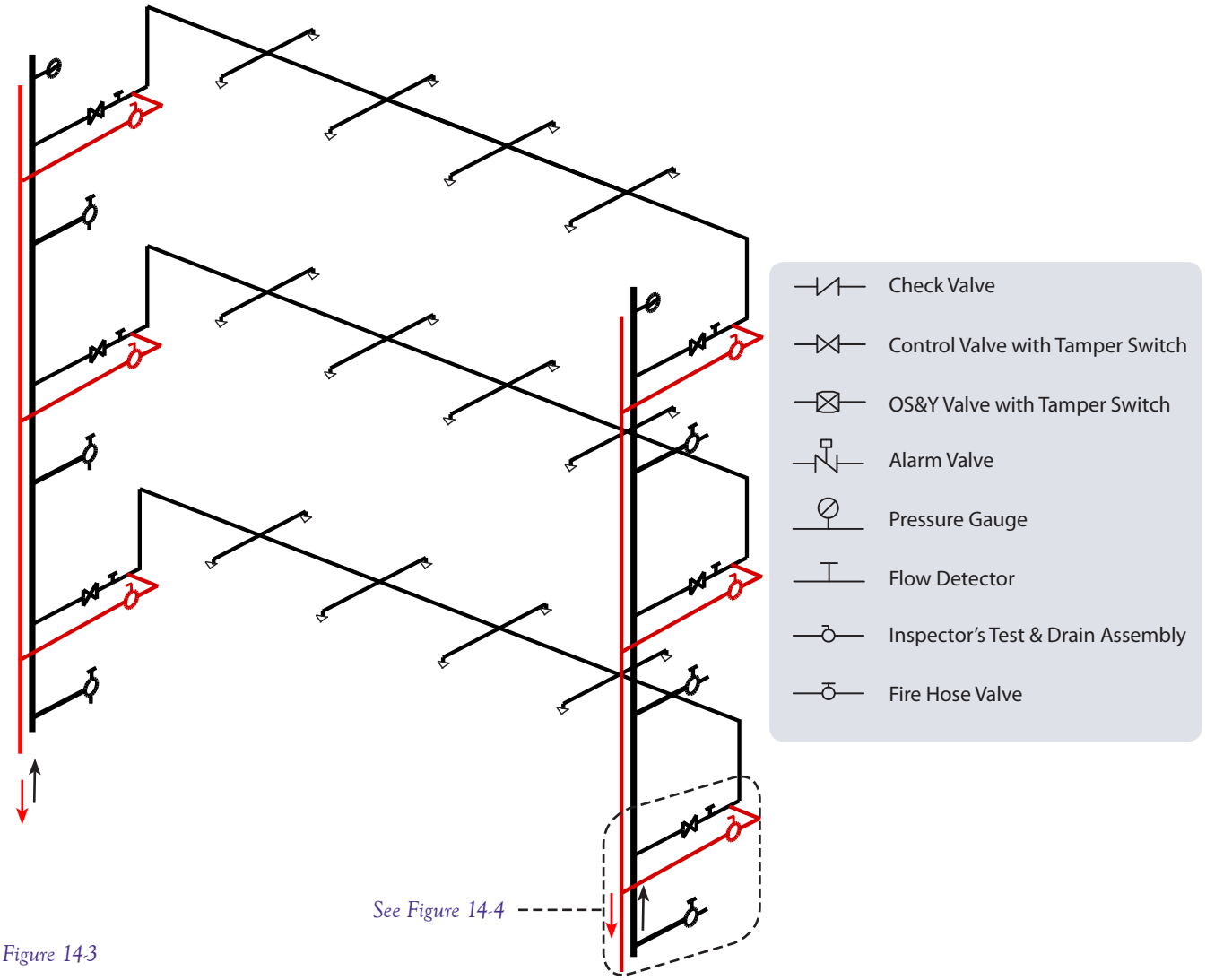


Figure 14-3

Floor Control Valve, Inspector's Test Assembly & Fire Hose Station

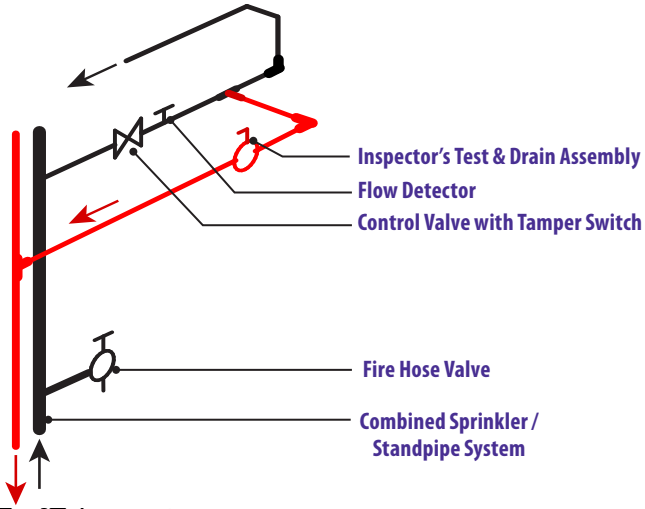


Figure 14-4

Design Standards © Marriott International, Inc.

Typical "Looped" High-Rise Guestroom Tower Sprinkler Riser Diagram

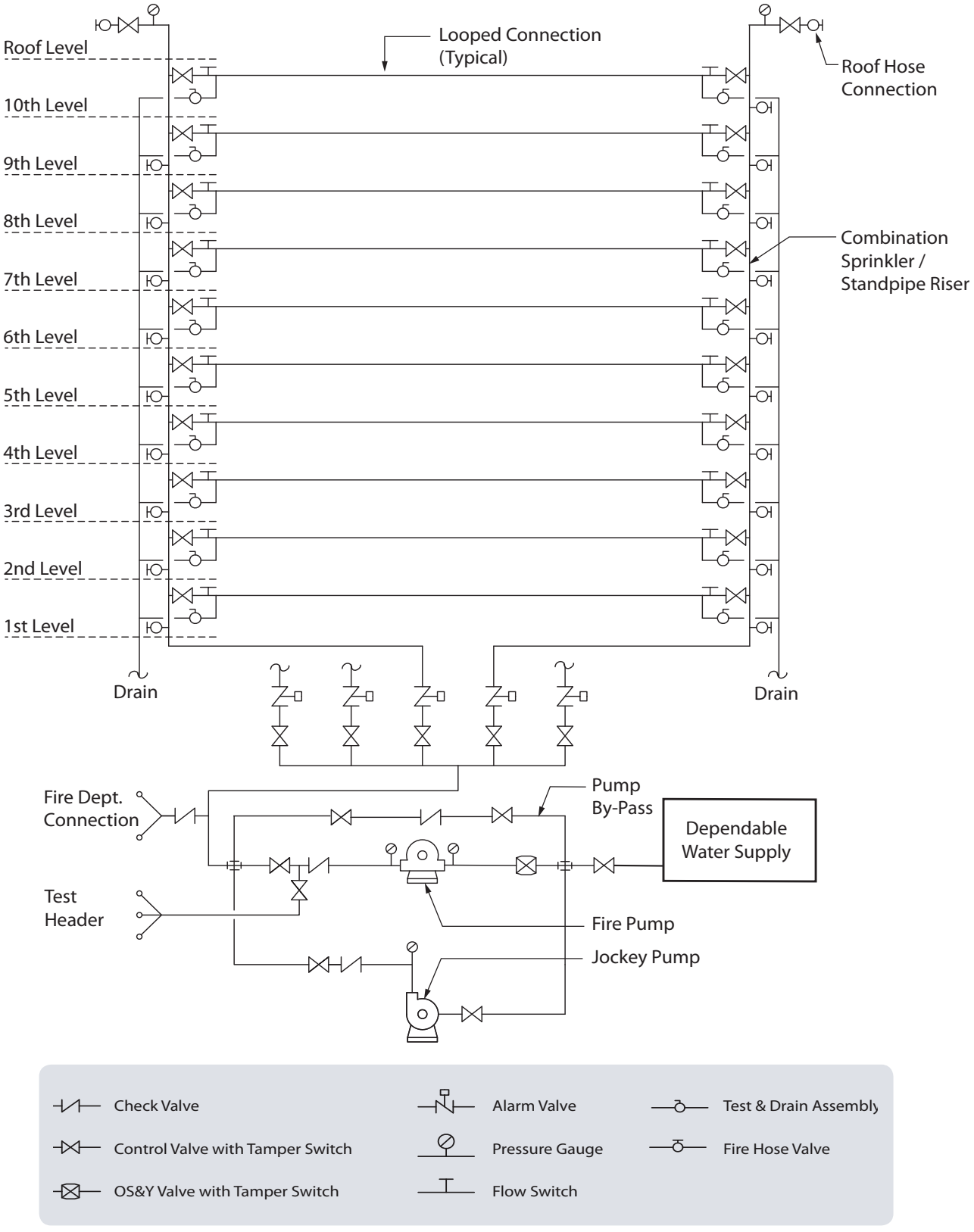


Figure 14-5

14.1 Fire Alarm System Sequence Matrix

Notes: Reference numbers are shown in parenthesis (1) for notes / notations indicated below and in headings to the right.	System Smoke Sensors (1)	System Heat Detectors (7)	Elevator shaft / machine room heat detectors (2)	Guestroom System Smoke Sensors (3)	Manual Pull Stations	Waterflow Switches	Dry Sprinkler Pressure Switches	Kitchen Hood & Duct Fire Suppression	Low / High Air Supply Switches	Duct Smoke Sensors	Sprinkler Valve Tamper Switches	Fire Pump Signals (8)	Emergency Generator Signals (9)	Carbon Monoxide Signals
FACP: Display an audible / visual alarm.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Remote Annunciator: Display an audible / visual alarm.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Audible / Visual Alarms: Activate audible / visual strobe appliances on affected floor. (5)	X	X			X	X	X	X						
Assembly Doors and Fire Doors: Release magnetic door holders on affected floor.	X	X				X	X							
Stairwell Pressurization: Activate pressurization.	X	X			X	X	X							
Smoke Exhaust: Activate exhaust system in affected zones.	X	X				X (4)	X (4)							
Guestroom Audible Alarms: Activate alarms in rooms on affected floor. (5)	X	X			X	X	X	X						
ADA Guestrooms Audible / Visual Signals: Activate both signals in ADA and hearing impaired guestrooms on affected floor. (5)	X	X			X	X	X	X						
Local Audible Alarms: Activate audible alarms only in rooms containing alarm.				X										X (6)
ADA Guestroom Local Audible / Visual Signals: Activate both signals only in hearing impaired and ADA guestroom containing alarm.				X										X (6)
Air Handlers: Automatically shut off associated air handlers.										X				
Kitchen Gas / Electric: Automatically shut off associated cooking line gas & electric and makeup air handler.								X						

General Notes:

- Fire alarm system devices are point addressable.
- On campus style properties, provide point addressable intelligent networking reporting to continuously attended property location.
- Sprinkler system water flow and tamper switch alarms are annunciated on the FACP.

(1) System smoke sensors not located in guestrooms.
(2) Provide associated elevator recall and shunt trip functions in compliance with ASME A-17.1, Elevator Code.
(3) Guestroom Smoke Sensors: Provide photoelectric type, with sounder base (minimum ratings of 85 dBA, with 75 dBA "at the pillow").
At suites, multiple sensors shall activate at the same time.
(4) Water flow alarms shall not activate smoke control exhaust fans where smoke control zones and fire sprinkler zones do not correspond.
(5) Fire alarms shall activate only on floor of alarm. Governing authority may require additional zoning.
(6) Carbon Monoxide detectors in guestrooms, public and BOH areas shall activate an alarm in the guestroom and rooms of incident and at the fire alarm control panel.
(7) We recommend not using heat detectors since fire sprinklers serve the same function.
(8) Provide alarm and signal devices remote from controller in compliance with NFPA 20.
(9) Provide alarm and signal devices remote from generator in compliance with NFPA 110.

Design Standards © Marriott International, Inc.

00 01 00 - BID SOLICITATION

ARCHITECT:
Meyers + Associates Architecture
232 N Third Street, Suite 300
Columbus, Ohio 43215

PROJECT:
Springhill Suites by Marriott
Arnold Palmer Drive
Latrobe, PA 15650

Single Prime contract bids are solicited by private invitation from Owner for all work associated with construction of a new Springhill Suites by Marriott facility located in Latrobe, PA.

COMPLETION TIME: Project to be completed within a time period indicated on the Bid Form. The Owner will receive faxed bids no later than 2:00PM, Tuesday, January 25, 2011 at the office of the Owner. Bids received after this time will not be accepted. Bids will be opened privately and without public disclosure, however, bidders will be advised of name and dollar amount of accepted bid and their relative standing.

The contract documents are available for purchase from Atlas Blueprint and Supply Inc., 374 W. Spring Street, Columbus, OH 43215, Phone: 614-224-5149, Fax: 614-224-2583. http://www.atlasblueprint.com at the non-refundable cost of $306.90 per set. Make check payable to Atlas Blueprint and Supply, Inc. Verify final print cost with printer prior for any additional shipping charges.

Proposal must be submitted on the forms supplied and according to the instructions set forth in the contract documents.

The Owner reserves the right to not accept any or all proposals, and the right to waive any irregularities in any proposal.

WITHDRAWAL OF PROPOSALS: No proposal may be withdrawn, except with the express permission of the Owner, after the hour set for the opening thereof, unless the award of the Contract is delayed for a period exceeding 30 days.

END OF SECTION

SECTION 00 21 13 - INSTRUCTION TO BIDDERS

THE OWNER'S INSTRUCTIONS TO BIDDERS

1. RECEIPT AND OPENING OF BIDS

The **Concord Sierra Palmer Hotel Associates, LP** (herewith called the "Owner") invites bids on the forms provided.

Bids will be received by the Owner until **2:00pm, Tuesday, January 25, 2011** and then and there privately opened. The owners requested preferred method is to receive bids via fax to the following number:

Attention: Tim Osiecki
Exec VP Development
Concord Hospitality Enterprises Company
Fax # (919) 455-2887

Please designate on the fax cover page as the Bid for "Springhill Suites by Marriott- Latrobe".

Within 48 hours of the Bid date or until **2:00pm, Thursday, January 27, 2011**, Bidders are to follow up with hard copies of the previous faxed Bid including the two additional requested items. Please designate the envelope as the Bid for "Springhill Suites by Marriott- Latrobe". The work is as set forth in the contract documents.

The envelope containing the hard copies of the previous submitted bid and the two additional requested items must be sealed and mailed/delivered to the following address:

Attention: Tim Osiecki
Exec VP Development
Concord Hospitality Enterprises Company
8601 Six Forks Road, Suite 540
Raleigh, NC 27615

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. No bid will be allowed to be withdrawn, for any reason, after it has been deposited with the Owner. Any bid received after the time and date specified shall not be considered.

The Owner reserves the right to accept any proposal made for the work advertised at any time within 14 days after the opening of bids.

2. PREPARATION OF BID

Each bid must be submitted on the forms provided. All blank spaces for bid prices must be filled, in ink or typewritten, in both words and figures. Prices for labor and materials shall be quoted separately. No additional prices or qualifying clauses shall be written in.

Each bid must contain the full name and address of each person and firm interested in the same and if applicable the name and address of the President of the Corporation bidding. Each bidder shall include in the space provided in the Proposal a detailed account of its experience, skill and financial standing and equipment available to perform the work.

Each bid must be initially submitted via fax with a cover page bearing the name of the bidder, his address, and the name of the project for which the bid is submitted. Each follow up hard copy of the bid submitted within 48 hours of the bid date, if forwarded by mail, the sealed envelope containing the bid must be placed in another envelope and addressed to the Owner as indicated above and notated “Sealed Bid Enclosed”.

Bid Security and Performance Bond is not required for this project.

3. TIME OF COMPLETION

Unless indicated otherwise on the Bid Form, by the Bidder, the Bidder must agree to be substantially complete with the project by Monday, January 09, 2012 with final completion and close-out by Monday, January 30, 2012.

4. ADDENDA AND INTERPRETATIONS

No oral interpretations of the meaning of the plans, specifications of other pre-bid documents will be made to any bidder.

Every request for such interpretations should be addressed to Owner and, to be given consideration, must be received at least (7) seven calendar days prior to the date fixed for opening of bids. Any and all such interpretations and any supplemental instruction shall be in the form of written addenda to the contract documents, which is issued, will be faxed with return notice of receipt requested or mailed by certified mail with return receipt requested to all prospective bidders not later than five (5) calendar days prior to the date fixed for the opening of bids. Failure of any bidder to receive such addenda or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become a part of the contract documents.

5. EXAMINATION OF SITE

Bidders are required to satisfy themselves by personal examination at the site of the work, and by examination and study of the contract documents as to the conditions existing and the difficulties likely to be encountered in the construction of the work. No plea of ignorance, as a result of failure to make such examinations on the part of the Contractor, will be accepted as an excuse to fulfill the provisions of the Contract or as a basis for extra compensation or extension of time.

6. SUB-SURFACE CONDITIONS

The Contractor shall make whatever additional investigations he feels necessary to prepare his bid to perform in accordance with the terms set forth herein. See SECTION 00 31 32 - GEOTECHNICAL DATA.

7. LAWS AND REGULATIONS

The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

8. DOCUMENTS REQUIRED AT TIME OF BIDDING VIA FAX

A. SECTION 00 41 13 - BID FORM.
B. SECTION 00 43 00 - SUPPLEMENT TO BID FORM - SUBSTITUTION SHEET.
C. SECTION 00 43 10 - SUPPLEMENT TO BID FORM - BREAKOUT PRICING.
D. SECTION 00 43 20 - SUPPLEMENT TO BID FORM - BIDDERS QUALIFICATIONS

9. DOCUMENTS REQUIRED WITHIN 48 HOURS OF TIME OF BIDDING VIA MAIL/DELIVERY

A. SECTION 00 41 13 - BID FORM.
B. SECTION 00 43 00 - SUPPLEMENT TO BID FORM - SUBSTITUTION SHEET.
C. SECTION 00 43 10 - SUPPLEMENT TO BID FORM - BREAKOUT PRICING.
D. SECTION 00 43 20 - SUPPLEMENT TO BID FORM - BIDDERS QUALIFICATIONS
E. SCHEDULE OF VALUES OUTLINED BY DIVISION *(additional requested item #1)*
F. PRELIMINARY DETAILED PROJECT DURATION SCHEDULE *(additional requested item #2)*

10. AWARD OF CONTRACT

The Contract, if let, will be awarded to the lowest, responsive, responsible bidder. In determining the awardee, the following elements may be considered: Whether the bidder

a. maintains a permanent place or business;
b. has adequate personnel and equipment to do the work properly and expeditiously;
c. has a suitable financial base to meet obligations incident to the work;
d. has appropriate experience;
e. has completed all items of the proposal responsively;
f. has inserted no qualifying phrases of unbalanced items on the proposal;
g. all subcontractors are responsible to review and comply with the full set of Construction Documents.

The Owner reserves the right to waive any informality in bidding and to reject any or all bids and expects that the Bidder is skilled and experienced in the use and interpretation of plans and specifications for this project and has found them free of ambiguities and sufficient for bid purposes. Further, he has carefully examined the site of the work and, from his own observations, has satisfied himself as to the nature and location of the work, the character, quality and quantity of materials, and the difficulties likely to be encountered, and other items, which may affect the completion and performance of the work. He has based his bid solely on these documents, including all addenda and has not relied in any way on any explanation or interpretation, oral or written, from any other source.

11. CONSTRUCTION SCHEDULE

Prior to the start of construction, a construction schedule shall be submitted to the Owner with all coordination issues, that need addressed. A list of emergency contact numbers is to be provided to the Owner. The contractor is required to call OUPS and identify any potential conflicts with existing underground utilities.

END OF SECTION

SECTION 00 31 32 - GEOTECHNICAL DATA

PART 1 - GENERAL

1.01 GEOTECHNICAL DATA

A. The Contractor is responsible to review geotechnical conditions, visit the site, and acquaint himself with all existing conditions.

B. A subsurface investigation, Report #J-10435; CE 129 550 and dated July 1, 2010 was performed at the site by Construction Engineering Consultants, Inc. Copies of this report may be purchased upon request at Atlas Blueprint and Supply, Inc.

C. Prior to bidding, bidders may make additional subsurface investigations to satisfy themselves as to site and subsurface conditions. Such investigations shall be performed under time schedules and arrangements approved in advance by the Owner.

1.02 SITE TOPOGRAPHIC SURVEY

A. Contractor is responsible to review survey data, visit the site, and acquaint himself with all existing conditions.
B. Field check general topographic information and reference points before bidding the Work. Report all discrepancies to Civil Engineer prior to beginning work. See Section 00 01 05 - CREDITS.

1.03 EXISTING DRAWINGS AND CONDITIONS

A. The Contractor is responsible to review existing conditions and acquaint himself with all existing conditions prior to submission of a bid.

B. Field verify all dimensions and existing conditions before beginning work. Report all discrepancies to the Civil Engineer prior to beginning work.

1.04 DISCLAIMER

A. Neither the Owner nor his consultants will be held responsible for accuracy of the information in the subsurface report and the site topographic survey. If additional information is needed, the Contractor shall contact the Architect to obtain such information prior to bidding.

PART 2 - PRODUCTS (NOT USED)

END OF SECTION

SECTION 00 41 13 - BID FORM

Project: **Springhill Suites by Marriott - Latrobe, PA**

TO: Concord Sierra Palmer Hotel Associates, LP

DATE: _____

Proposal of _____(hereinafter called "Bidder"), organized and existing under the laws of the State of _____, doing business as *_____ _____, to the Concord Sierra Palmer Hotel Associates, LP (hereinafter called "Owner"): *Insert "a corporation", "a partnership" or "an individual", as applicable.

Communications concerning this Bid shall be addressed to:

Name: _____
Title: _____
Address: _____
Phone Number:_____
Fax Number: _____
E-mail Address: _____

In compliance with your Bid Solicitation, Bidder hereby proposes to perform all Work for the construction of the **Springhill Suites by Marriott, Latrobe, PA**, in strict accordance with the Contract Documents, within the time set forth therein at the price stated below.

The Bidder shall reference SECTION 01 10 00 – SUMMARY for description of Work related to Bidding the purchasing of the Project. The scope of work of this Contract shall include all material and labor required to construct the new structure in accordance with the Contract Documents.

The signer of this Bid Proposal, as Bidder, declares that the only person, persons, company or parties interested in this proposal are named in this proposal and that he has carefully examined the Legal Notice, Instructions to Bidders, the Proposal, Contract Documents, and that he or his representative has made such investigation as is necessary to determine the character and extent of the specifications and he proposes and agrees that if this proposal is accepted, he will contract with the Owner in the form of a contract hereto enclosed to provide the specified equipment, along with any parts, tools or necessary labor to complete the contract requirements and according to the requirements of the Owner, as contained in the contract documents; furnish the required surety bond, if required; furnish all items of work according to the contract documents prepared for the Owner and in strict compliance therewith and subject to the approval of the Owner for the following price(s):

A) BASE BID CONTRACT

1) Single Prime Contract: **MATERIAL COST** for General Trades (including Sitework, Landscape and MEP&FP, contracts):

$_____ (IN NUMBERS)

MATERIAL COST IN WORDS: _____

_____ and _____ / 100 dollars.

2) Single Prime Contract: **LABOR COST** for General Trades (including Sitework, Landscape and MEP&FP, contracts):

$_____ (IN NUMBERS)

LABOR COST IN WORDS: _____

_____and _____ / 100 dollars.

3) Single Prime Contract: **TOTAL COST** for General Trades (including Sitework, Landscape and MEP&FP, contracts):

$_____ (IN NUMBERS)

TOTAL COST IN WORDS: _____

_____and _____ / 100 dollars.

B) BID ALTERNATES

(See Section 01 23 00 – ALTERNATES for additional description). Bidder shall circle the appropriate choice (ADD or DEDUCT) below and insert amount.

1) ALTERNATE #1 - FLOOR SHEATHING: If Alternate is accepted, ADD TO / DEDUCT FROM Base Bid: $_____

Sum in words: _____

_____ and _____ / 100 dollars.

2) ALTERNATE #2 - LEED CERTIFIED WOODS: If Alternate is accepted, ADD TO / DEDUCT FROM Base Bid: $_____

Sum in words: _____

_____ and _____ / 100 dollars.

3) ALTERNATE #3 - CPVC WET SPRINKLER PLUMBING: If Alternate is accepted, ADD TO / DEDUCT FROM Base Bid: $_____

Sum in words: _____
_____ and _____ / 100dollars.

4) ALTERNATE #4 - FIBERGLASS MAT GYPSUM INTERIOR WALL PANEL: If Alternate is accepted, ADD TO / DEDUCT FROM Base Bid: $_____

Sum in words: _____
_____ and _____ / 100dollars.

5) ALTERNATE #5 – PLUMBING FIXTURE LAV-3: If Alternate is accepted, ADD TO / DEDUCT FROM Base Bid: $_____

Sum in words: _____
_____ and _____ / 100dollars.

6) ALTERNATE #6 – WATER DRAINAGE EXTERIOR INSULATION FINISH SYSTEM: If Alternate is accepted, ADD TO / DEDUCT FROM Base Bid: $_____

Sum in words: _____
_____ and _____ / 100dollars.

7) ALTERNATE #7 – INDOOR WATER FEATURE AT POOL: If Alternate is accepted, ADD TO / DEDUCT FROM Base Bid: $_____

Sum in words: _____
_____ and _____ / 100dollars.

C) ALLOWANCES

Bidders shall provide allowances as specified in Section 00 21 00 – ALLOWANCES:

1) Plumbing Fixtures: $_____

Sum in words: _____
_____ and _____ / 100dollars.

2) Lighting Fixtures: $_____

Sum in words: _____
_____ and _____/100dollars.

3) Indoor Water Feature at Pool: $16,000 **(include this amount in your bid)**

Sum in words: Sixteen Thousand and 00 /100dollars.

D) UNIT PRICES

Bidders shall provide the following unit prices to provide operational:

Material	Unit Price	Unit of Measure
1) Sprinkler head	$ _____	each
2) Wall Switch	$_____	each
3) Wall Receptacle	$_____	each

E) SUBSITUTIONS

Bidders shall provide a List of Substitutions as specified in Section 00 43 00 – SUBSTITUTION SHEET.

F) BREAK OUT PRICING

Bidders shall provide break-out pricing as specified in Section 00 43 10 – BREAK OUT PRICING.

G) INDEPENDENT BID PREPARATION:

By submission of this Bid, each Bidder certifies, and in the case of a joint Bid, each party thereto certifies as to his/her own organization, that this Bid has been arrived at independently, without consultation, communication or agreement as to any matter relating to this Bid with any other Bidder or with any competitor.

H) PROJECT COMPLETION SCHEDULE:

The Bidder hereby agrees to complete the Work under this Contract per terms and conditions specified in Section 00 10 00 - BID SOLICITATION and to be substantially complete the Project within _____ consecutive calendar days from the Owner's Notice to Proceed. The Owner's required final completion date shall be no later than Monday, January 30, 2012.

I) ADDENDA:

Bidder acknowledges receipt of the following Addendum:

No.:_____ Date: _____, 2011

No.:_____ Date: _____, 2011

No.:_____ Date: _____, 2011

J) MODULE 14:

By signing below**,** Bidder acknowledges receipt and review of Module 14 - Marriott Design Standards for Fire and Life Safety dated January 2010 within the Contract Documents.

Signature:_____ Date: _____, 2011

K) NAME OF PERSONS, PARTIES, OR CORPORATIONS:

The full names and addresses of all persons, parties or corporation interested in the foregoing Bid as principles are as follows:

NAME ADDRESS

_____
_____

_____
_____

_____
_____

Name of Company
_____

Signature of Bidder
_____

Title of Bidder
_____

Business Address of Bidder_____

_____
_

_____
_

Dated at _____, this _____ day of _____, 2011

(Principal must indicate whether Corporation, Partnership, Company or Individual.)

THE PERSON SIGNING SHALL, IN HIS OWN HANDWRITING, SIGN THE PRINCIPAL'S NAME, HIS OWN NAME AND HIS TITLE. WHERE THE PERSON IS SIGNING FOR A CORPORATION, HE MUST, BY AFFIDAVIT, SHOW HIS AUTHORITY TO BIND THE CORPORATION.

END OF BID FORM

SECTION 00 43 00 - SUBSTITUTION SHEET

Refer to Instructions to Bidders and General Conditions regarding use of materials and methods. All bids must be based on the “Products” and "Standards" specified documented by the **Bid Documents issued January 04, 2011** and the addenda thereto.

Bidder is to list "Substitution" items for which consideration is desired. Indicate whether they are an “addition to” or a “deduction from” the Base Bid, or state "No Change in Price".

The Bidder shall include this form with the Bid Form.

ITEM SPECIFIED	PROPOSED SUBSTITUTION	ADD	DEDUCT	NO CHANGE

It is understood and agreed that the Proposal submitted is based on furnishing “Products” and "Standards" as specified and entitles the Owner to require that such named materials and methods be incorporated into the work, except as Substitutions, if they are accepted, based on the quotations entered above, they are subsequently made a part of the written contract.

SIGNED:_____
Bidder

END OF SECTION

SECTION 00 43 10 - BREAK OUT PRICING

Bidder shall list, and attach to the Bid Form, break-out pricing for the items listed below. List on the appropriate line below the Material-only costs for evaluation by the Owner.

Item	**Material**
1) Scheduled Plumbing Fixtures:	
WC-1	$_____.00
WC-2	$_____.00
WC-3	$_____.00
WC-4	$_____.00
LAV-1	$_____.00
LAV-2	$_____.00
LAV-3	$_____.00
LAV-4	$_____.00
UR-1	$_____.00
S-1	$_____.00
LT-1	$_____.00
MS-1	$_____.00
BT-1	$_____.00
BT-2	$_____.00
SH-1	$_____.00
SH-2	$_____.00
EWC-1	$_____.00
EW-1	$_____.00
2) Building Lighting:	
Interior Lighting Fixtures	$_____.00
Exterior Lighting Fixtures	$_____.00
3) Site Lighting:	
Site lighting Fixtures	$_____.00
Site lighting Poles	$_____.00
4) Lighting Dimming System	$_____.00
5) INNCOM – Energy Management System	$_____.00

6) Wood Panel Ceiling Systems as specified under Section 09 54 29:

Radial Wood Panel Ceiling	$_____.00
Wood Panel Ceiling	$_____.00

7) CATV/Data/Telephone Cabling:

Material	$_____.00
Labor	$_____.00

END OF SECTION

SECTION 00 43 20 - BIDDER QUALIFICATIONS

Project Name: **Springhill Suites by Marriott – Latrobe, PA**

Company Name: _____

Address: _____
Street, Building, Unit

_____
City, State, Zip

Telephone: (_____) _____

Fax Number: (_____) _____ Email address:_____

QUALIFICATION ITEMS:

1. **Overall Experience, Facilities & Equipment:** Bidder shall submit a letter on company letterhead stating overall experience performing work in your trade. Also indicate relevant facilities and equipment (leased or owned) to complete the work of this Project.

2. **LEED Coordinator:** Bidder shall submit a certification letter stating that a LEED Coordinator will be assigned to the project for its duration, including all documentation at time of Project close out. This individual shall be an experienced LEED-Accredited Professional that is capable of coordinating all LEED submittals and formwork necessary to meet a "certified" level of accreditation. The LEED coordinator shall also serve as waste management coordinator. In addition to the certification letter provide a list of projects completed that are LEED certified within the last (5) five years.

3. **Project Personnel:**

   Identify individuals assigned to this Project.

   Role:_____

   Name:_____Years with firm _____Total Exp. _____

Role:_____

Name:_____Years with firm _____Total Exp. _____

Role:_____

Name:_____Years with firm _____Total Exp. _____

Role:_____

Name:_____Years with firm _____Total Exp. _____

Certification:

I hereby certify that the above information, including all attachments and referenced information, is factual and complete.

Company Name_____

Authorized Official (please print or type) _____

Signature of Authorized Official _____ Date _____

END OF DOCUMENT

SECTION 00 51 00 - NOTICE OF AWARD

_____.

_____.

_____.

RE: **Springhill Suites by Marriott – Latrobe, PA**

The Owner has considered the bid proposal submitted by you on **Tuesday, January 25, 2011** for the above referenced project in response to its Bid Solicitation.

You are hereby notified that your bid proposal has been accepted for the project in the amount

of $_____.

You are required by the Contract Terms to execute the Agreement and furnish the required Insurance Certification within ten (10) calendar days from the date of this Notice.

If you fail to execute the agreement and furnish said conditions according to law and the Contract Documents within the aforesaid ten (10) days from the date of this Notice then the Owner will be entitled to consider all of your rights arising out of the acceptance of your proposal as abandonment. The Owner shall then be entitled to such other rights as may be granted by law.

You are required to return an acknowledgment copy of this Notice of Award to the Owner.

Dated this _____ day of_____, 2011.

Concord Sierra Palmer Hotel Associates, LP

BY: _____

ACCEPTANCE OF NOTICE

Receipt of the foregoing Notice of Award is hereby acknowledged by

_____, this _____ day of _____, 2011.

_____
Contractor

BY: _____

_____
Title

END OF DOCUMENT

SECTION 00 52 13 – FORM OF AGREEMENT

PART 1 GENERAL

AIA DOCUMENT A101 – Standard Form of Agreement between Owner & Contractor - Stipulated Sum (2007 Edition)

Is made a part of the Project Manual by this reference

END OF SECTION

SECTION 00 55 00 - NOTICE TO PROCEED

DATE: _____

_____

_____

_____

RE: **Springhill Suites by Marriott – Latrobe, PA**

You are hereby notified to commence work in accordance with the Agreement dated the

_____ day of _____, 2011 and agree to complete this project on or before

January 30, 2012.

Concord Sierra Palmer Hotel Associates, LP

BY: _____

ACCEPTANCE OF NOTICE

Receipt of the foregoing Notice to Proceed is hereby acknowledged by

_____, this _____ day of _____.

_____
Contractor

BY: _____

_____
Title

END OF NOTICE TO PROCEED

SECTION 00 72 13 - GENERAL CONDITIONS

PART 1 GENERAL

AIA DOCUMENT A201 – GENERAL CONDITIONS (2007 Edition)

Is made a part of the Project Manual by this reference

END OF SECTION

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 00 - Procurement and Contracting Requirements, General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section and all other Sections of the Specification.

1.2 SUMMARY

A. Section includes:
1. Project information.
2. Work covered by Contract Documents.
3. Specification and drawing conventions.

1.3 PROJECT INFORMATION

A. Project Identification: Springhill Suites by Marriott

B. Project Location: Arnold Palmer Drive, Latrobe, PA 15650

C. Credits: Refer to Section 00 00 05 - CREDITS.

D. Sustainable Design Requirements:
1. Refer to Section 01 81 13 for general requirements and procedures for compliance with USGBC LEED prerequisites and credits needed for the Project to obtain LEED certification based on LEED-NC (New Construction), 2009.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of, but is not limited to, the following:
1. Sitework and Utilities
2. Landscape
3. General
4. Fire Protection
5. Plumbing
6. HVAC
7. Electrical

B. Regulatory Authorities:
1. The building code for the project is the International Building Code (IBC), 2009 Edition. Building Code Compliance review and permitting will be through The Unity Township Department of Building Safety. Initial building permits application will be by the A/E with all fees paid by the successful bidder. All other permits required for completion of the Work shall be secured and paid for by the contractor performing the Work.
2. Building Information: The building construction type and occupancy classifications are defined as:
a. Occupancy: Separated Mixed Used R1 / A-3
b. Construction Type: 5A
c. Fire Protection: The building is equipped with an automatic sprinkler system.

C. Type of Contract.
1. The Project shall be constructed under a stipulated sum, single prime contract.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 - Procurement and Contracting Requirements apply to the Work of all Sections in the Specifications.

C. Division 01 - General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
   3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.
   1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:
   1. Lump-sum allowances.

C. Related Sections:
   1. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP SUM ALLOWANCES

A. Contractor's costs for taxes, freight, delivery to project site, receiving and handling at project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum base bid amount and not part of the allowance.

B. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. ALLOWANCE NO. 1 - PLUMBING FIXTURES: Bidder to establish a lump sum allowance for all plumbing fixtures based on fixtures indicated on the drawings and specified under Division 22.

1. This allowance to include material cost only, See Para 1.6A above.

B. ALLOWANCE NO. 2 - LIGHTING FIXTURES: Bidder to establish a lump sum allowance for all lighting fixtures based on fixtures indicated on the drawings and specified under Division 26.

1. This allowance to include material cost only, See Para 1.6A above.

C. ALLOWANCE NO. 3 – INDOOR WATER FEATURE IN POOL: The owner has established an allowance for an owner provided pre-manufactured water feature to be included in the bid. Bidder to include a lump sum allowance of $16,000 for the purchase of the water feature and the provided manufacturer's standard install labor.

END OF SECTION

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to, or deducted from to the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
   2. The cost for each alternate is the net addition to or deduction from, the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
   3. Shipping and freight, tax, markup, receiving, handling and onsite storage, including associated warranty costs shall be in the Base Bid.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to, or required for, a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. ALTERNATE #1: FLOOR SHEATHING.
1. Base Bid: Provide plywood subfloor sheathing as specified in Section 06 10 00 ROUGH CARPENTRY and indicated on the drawings.
2. Alternate Bid: State the amount on the Bid Form to be added to, or deducted from, the Base Bid to provide OSB Subfloor Sheathing specified in Section 06 10 00 ROUGH CARPENTRY in lieu of the plywood product.

B. ALTERNATE #2: LEED CERTIFIED WOODS.
1. Base Bid: Provide standard wood products in accordance with Section 06 10 00 ROUGH CARPENTRY and Section 06 20 00 FINISH CARPENTRY where indicated on the drawings.
2. Alternate Bid: State the amount on the Bid Form to be added to, or deducted from, the Base Bid to meet the LEED requirements specified in Section 06 10 00 ROUGH CARPENTRY and Section 06 20 00 FINISH CARPENTRY.

C. ALTERNATE #3: CPVC WET SPRINKLER PIPING
1. Base Bid: Provide all above ground wet sprinkler piping as black steel in accordance with Section 2110 00 FIRE SURPRESSION SYSTEM.
2. Alternate Bid: State the amount on the Bid Form to be added to, or deducted from, the Base Bid to provide CPVC wet sprinkler piping in lieu of the black steel specified.

D. ALTERNATE #4: FIBERGLASS MAT GYPSUM INTERIOR WALL PANEL
1. Base Bid: Provide fiberglass mat gypsum interior wall panel – DensArmor Plus in accordance with Section 09 21 16 GYPSUM BOARD ASSEMBLIES and at locations indicated on the drawings.
2. Alternate Bid: State the amount on the Bid Form to be added to, or deducted from, the Base Bid to provide fiberglass mat gypsum interior wall panel – DensArmor Plus at all locations through-out interior of building scheduled to receive gypsum wallboard.

E. ALTERNATE #5: PLUMBING FIXTURE LAV-3
1. Base Bid: Provide LAV-3 as the Kohler “Verticyl” Oval in accordance with Plumbing Fixture Matrix sheet P-900 and Section 22 40 00 PLUMBING FIXTURES at locations indicated on the drawings.
2. Alternate Bid: State the amount on the Bid Form to be added to, or deducted from, the Base Bid to provide LAV-3 as the Kohler “Caxton” Model # K2210-0 in lieu of the scheduled Kohler “Verticyl” Oval fixture at locations indicated on the drawings.

F. ALTERNATE #6: WATER DRAINAGE EXTERIOR INSULATION FINISH SYSTEM
1. Base Bid: Provide Water Drainage Exterior Insulation System in accordance with Section 07 24 19 WATER DRAINAGE EXTERIOR INSULATION FINISH SYSTEM at locations indicated on the drawings.
2. Alternate Bid: State the amount on the Bid Form to be added to, or deducted from, the Base Bid to provide Water Drainage Exterior Insulation System in accordance with Section 07 24 19 WATER DRAINAGE EXTERIOR INSULATION FINISH SYSTEM in lieu of Metal Plate Wall Panels, but maintaining indicated profiles and shapes, at locations indicated on the drawings.

G. ALTERNATE #7: INTERIOR WATER FEATURE IN POOL
1. Base Bid: Provide all required rough-in utilities as illustrated and mounting requirements for a pre-manufactured water feature at location indicated on the drawings.
2. Alternate Bid: State the amount on the Bid Form to be added to, or deducted from, the Base Bid to remove all shown rough-in utilities that support the pre-manufactured water feature and any additional blocking for mounting; fill in illustrated void and continue stone interior finish across extents at location indicated on the drawings.

END OF SECTION

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:
1. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use facsimile of form following this Section.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project. Compliance must be from a Referenced Standard listed in the governing code.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
a. Forms of Acceptance: Addenda issued 7days prior to bid, Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.

e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION

See attach “Form of Substitution Request”

SECTION 01 25 01 - SUBSTITUTION REQUEST FORM

□ BIDDER, □ CONTRACTOR,
(Submit 2 copies)

Date: _____

Request No._____

Project: **Springhill Suites by Marriott - Latrobe, PA**

To: Meyers + Associates Architecture
232 N. Third Street, Suite 300
Columbus, Ohio 43215
☏ 614.221.9433 🖷 614.221.9441
Contact: Shawn Conyers

From: (Name and Address of Bidder/Contractor)
_____
_____
_____

Hereby request approval of the following product or systems as an "approved substitution"

NAME AND DESCRIPTION OF SPECIFIED PRODUCT OR SYSTEM:

_____
_____
_____
_____
_____

SPECIFICATION SECTION NO. _____, PAGE(S) _____, PARAGRAPH(S) _____

DRAWING NO.(S)_____,DETAIL OR SECTION NO.(S) _____

Use the following submittal form for each substituted product.

SPECIFIED PRODUCT	PROPOSED PRODUCT
Material:	Material:
Flammability (ASTM E 84)	Flammability (ASTM E 84)
Flame Spread _____	Flame Spread
Smoke Density	_____
_____	Smoke Density _____
Moisture Absorption _____	Moisture Absorption _____
Elasticity _____	Elasticity _____
Water Resistance _____	Water Resistance _____
Strength:	Strength:
Compressive	Compressive
_____	_____
Tensile _____	Tensile _____
Bond:	Bond:
Tensile _____	Tensile _____
Shear _____	Shear _____
Substrate Compatibility: Installation On:	Substrate Compatibility: Installation On:
Concrete	Concrete
_____	_____
Masonry _____	Masonry _____
Steel Frame _____	Steel Frame _____
Gypsum Board _____	Gypsum Board _____
Test Reports:	Test Reports:
Is exact condition covered? _____	Is exact condition covered? _____
Rated Assembly? _____	Rated Assembly? _____

Restrictions: Substrate: Floor _____ Roof _____ Wall (non-rated) _____ Wall (rated) _____ Structure: Masonry _____ Concrete _____ Steel _____ Environmental Restrictions: Outside Air Temperature _____ Inside Air Temperature _____ Relative Humidity _____ Moisture Content _____ Moisture Test Req'd. _____ Structural Restrictions: Wind Load _____ Snow Load _____ Equipment Loads _____ Warranty _____ Availability _____ Costs _____	Restrictions: Substrate: Floor _____ Roof _____ Wall (non-rated) _____ Wall (rated) _____ Structure: Masonry _____ Concrete _____ Steel _____ Environmental Restrictions: Outside Air Temperature _____ Inside Air Temperature_____ Relative Humidity _____ Moisture Content _____ Moisture Test Req'd. _____ Structural Restrictions: Wind Load _____ Snow Load _____ Equipment Loads _____ Warranty _____ Availability _____ Costs _____

REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEM / SYSTEM:

_____
_

SUBSTITUTION AFFECTS OTHER MATERIALS OR SYSTEMS:
☐ YES, ☐ NO; IF YES, attach complete data.

SUBSTITUTION REQUIRES DIMENSIONAL REVISION OR REDESIGN OF STRUCTURE OR MECH/ELEC WORK:
☐ YES, ☐ NO; IF YES, attach complete data.

SAVINGS OR CREDIT TO OWNER FOR ACCEPTING SUBSTITUTE:
$_____

THE ATTACHED DATA IS FURNISHED TO SUPPORT EVALUATION OF SUBSTITUTE:

_____CATALOG, _____DWG'S., _____SAMPLES, _____TESTS,

_____REPORTS, _____OTHER

THE UNDERSIGNED HEREBY CERTIFIES THAT THE SUBSTITUTION HAS BEEN FULLY CHECKED AND COORDINATED WITH THE CONTRACT DOCUMENTS.

BY:
_____
(Firm Name)
_____
_
Address City State Zip Code
_____
_
Phone Fax

(THE FOLLOWING TO BE COMPLETED BY ARCHITECT)

SUMMARY:
SUBSTITUTION APPROVED: ☐ YES, ☐ NO BY: _____
DATE:
APPROVED WITH RESTRICTIONS:

1._____
_
2._____
_
RESUBMITTAL REQUIRED: ☐ YES, ☐ NO

REMARKS:
_____
_
_____
_____

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Change Orders.

B. Architect's Supplemental Instructions.

C. Construction Change Directive.

1.02 RELATED SECTIONS

A. General Conditions of the Contracts for Design and Construction.

1.03 DEFINITIONS

A. Document Packages: The design and documentation of the Construction Documents for this Project have been issued as one complete set of documents by the Architect and his consultants.

1.04 CHANGE ORDERS

A. Bulletin: When job conditions require changes in the work, the Architect shall prepare a Bulletin detailing the proposed changes and shall furnish copies to the Contractor who shall furnish copies all his subcontractors.

B. Proposal Procedure: The Contractor solicits proposals, based on Bulletin requirements, from his subcontractors and material suppliers and prepares a line item estimate proposal.
1. The proposals from subcontractors should also show line item description with quantities, unit labor and material costs. The total labor costs should be shown at the base rate to which total fringe costs and markups should be added.
2. The subcontractor markup should conform to the guidelines described. Copies of such subcontract and material supplier proposals should be included in the Contractor's submission to the Architect.
3. Lump sum amounts without breakdown will be rejected.
4. All proposals for change orders shall be made out by the Contractor in the number requested and submitted to the Architect within 14 days after receipt of proposal request. Furnish an itemized detailed breakdown of the quantities and costs used in computing the value of any change by contractor and subcontractor as applicable.

C. Change Order: Upon receipt of Contractor's proposal, and Owner's approval of the estimated costs, a Change Order will be prepared by the Architect and sent to the Owner for his signature.
1. Form: AIA Document G701.
2. Execute in duplicate with Architect and Owner each retaining an original copy.
3. Signatures of Architect and Owner are required for valid Change Order.
4. Final back up for Change Order is limited to 60 days from Owner’s approval of any estimated cost.

D. All costs associated with preparation and submission of requested proposals to be included in overhead and profit.

E. Overhead and Profit:
1. No Overhead and Profit is allowed for the first $150,000 in change orders. After this threshold the following contractor overhead and profit shall apply:
2. Lump Sum Method: Where itemized lump sum method set forth in General Conditions is used, the contractor and all subcontractors agree to charge and accept payment for his overhead and profit, as directed by the Owner, but no greater than the following percentages

of the cost of the Work. All overhead and profit must have the approval of the Owner.
a. Five percent (5%) for work by 1st tier contractors not involving subcontractors.
b. Five percent (5%) for work by 2nd tier and lower contractors.

2. When both additions and credits covering related Work or substitutions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any, with respect to that change.
3. In the event any one change results in a net credit or deduction, no overhead and profit percentage of the said net will be credited to the Owner by the Contractor or subcontractors.
4. Overhead and Profit includes cost of supervision, (job and office), bond, telephone, copying, secretaries, office, power, light tools, light scaffolding, and other general expenses.
5. The Owner will not pay for change orders that do not align with the General Conditions or change orders that are unapproved in advance of their submittal.

F. The Architect and Owner reserve the right to audit the Contractor's and subcontractor's records insofar as the "Line Item Cost" before commitments are made.

1.05 ARCHITECT'S SUPPLEMENTAL INSTRUCTIONS

A. For minor changes in the Work not involving change to Contract Sum or Contract Time.

B. Form: AIA Document G710.

C. Document issued by Architect to the Contractor for his signature indicating acceptance of instructions as consistent with the Contract Documents.
1. Owner's signature not required.

1.06 CONSTRUCTION CHANGE DIRECTIVE

A. See General Conditions.

B. Provides mechanism to continue work where Contractor disagrees with terms of proposed Change Order or for changes in the Work which may involve change to Contract Sum or Contract Time where time for direction is critical to expedite, minimize, or avoid delays in the Work.

C. Form: AIA Document G714.

D. This document is issued by Architect with Owner's signature. Contractor’s confirming signature not required.

E. Document signed by Owner and Architect.

F. The Contractor is directed to proceed immediately with the changed work and submit costs associated with the change for inclusion in subsequent Change Order.

G. Proposed cost and time terms to be indicated on the form.
1. If Contractor signs Construction Change Directive, the Architect will issue a Change Order.
2. When such terms are not acceptable to the Contractor, he shall advise the Architect and the Owner and adjustment will be made in accordance with the General Conditions.

END OF SECTION

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SCHEDULE OF VALUES

A. Prepare the schedule of values in such a manner that each major item of work and each subcontracted item of work is shown as a single line item of Application and Certificate for Payment, Continuation Sheet furnished by Architect.

B. Tax Abatement and Wage information Reporting. Refer to Section 01 10 00 – Summary for description and formwork included after this Section.

C. Additional Single Line Items:
1. Schedule Overhead and Profit as a single line item.
2. Schedule other General Conditions costs by individual line items.

D. Submit schedule of values to Architect within fifteen (15) working days prior to first request for payment.

1.2 PROGRESS PAYMENTS

A. Forms: The form of application payment shall be AIA Document G702, Application and Certification for Payment, supported by Continuation Sheet G703.

B. Retainage: Retainage is as stated in General Conditions.

C. Procedure:
1. Request for Payments to be made at intervals not less than one month.
2. Submit notarized Application for Payment to the Owners representative in accordance with Para. 11.3 of the General Conditions.
3. Payment of application submission to be made within 20 days from the submission / invoice date provided the following conditions are met:
   a. Application for Payment submitted on the 30th day of each month. Applications later than the 5th day of the following month will not be accepted and will require the contractor to combine the application with the next application for payment. Once payment is accepted by the Owner allow a total 20 days for processing.
   b. Review and approval of the application by the Architect will be coordinated through the Owner's representative. The Architect shall have 7days for his review.
4. Rejected Applications, after revisions completed, will be treated as a new Application when submitted.
5. Release of Lien: All payment requests following the first request are to include a contractor, subcontractor and supplier Release of Lien form.
6. Payments may be withheld; as described in General Conditions and as indicated above.

1.3 RELEASE OF RETAINAGE

A. When release of retainage is permitted, all such releases to be accompanied by consent of surety using the following forms:
1. Partial Release: AIA Document G707A.
2. Final Payment: AIA Document G707.

1.4 FINAL PAYMENT

A. Final payment, including all retainage, will be due the Contractor 30 days after the completion and acceptance of all work under the contract

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.
   1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
   2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 15 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
   3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
      a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
   4. Format: Arrange the following information in a tabular format:
      a. Scheduled date for first submittal.
      b. Specification Section number and title.
      c. Submittal category: Action, informational.
      d. Name of subcontractor.
      e. Description of the Work covered.
      f. Scheduled date for Architect final release or approval.
      g. Scheduled dates for purchasing.
      h. Scheduled dates for installation.
      i. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
   3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
   4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Lead Contractor, when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 7 days for review of each resubmittal.
   4. Sequential Review: Where sequential review of submittals by Architect's consultants, the Owner, or other parties is indicated, allow 14 days for initial review of each submittal.
   5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 7 days for review of each submittal. Submittal will be returned to the Architect, before being returned to Contractor.

C. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by the Architect. All submittals are to have a Contractor stamp indicating a review has been completed prior to being forwarded to the Architect for approvals.
   3. Include the following information for processing and recording action taken:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Name of subcontractor.
      f. Name of supplier.
      g. Name of manufacturer.
      h. Submittal number or other unique identifier, including revision identifier.
         1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).
      i. Number and title of appropriate Specification Section.
      j. Drawing number and detail references, as appropriate.
      k. Location(s) where product is to be installed, as appropriate.
      l. Other necessary identification.

D. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
   1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
   2. Name file with submittal number or other unique identifier, including revision identifier.
      a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-06 10 00.01.A).
   3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
   4. Include the following information on an inserted cover sheet:
      a. Project name.
      b. Date.
      c. Name and address of Architect.
      d. Name of Contractor.
      e. Name of firm or entity that prepared submittal.
      f. Name of subcontractor.
      g. Name of supplier.
      h. Name of manufacturer.
      i. Number and title of appropriate Specification Section.
      j. Drawing number and detail references, as appropriate.
      k. Location(s) where product is to be installed, as appropriate.
      l. Related physical samples submitted directly.
      m. Other necessary identification.
   5. Include the following information as keywords in the electronic file metadata:
      a. Project name.
      b. Number and title of appropriate Specification Section.
      c. Manufacturer name.
      d. Product name.

E. Options: Identify options requiring selection by the Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
   1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

H. Transmittal: Contractor to assemble each submittal individually and appropriately for transmittal and handling. Transmit each item using a transmittal form. The Architect will not accept submittals received from sources other than the General Contractor.
   1. Transmittal Form: Provide locations on form for the following information:
      a. Project name.
      b. Date.
      c. Destination (To:).
      d. Source (From:).
      e. Names of subcontractor, manufacturer, and supplier.
      f. Category and type of submittal.
      g. Submittal purpose and description.
      h. Specification Section number and title.
      i. Indication of full or partial submittal.
      j. Drawing number and detail references, as appropriate.
      k. Transmittal number.
      l. Submittal and transmittal distribution record.

m. Remarks.
n. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Requirements for submittals are indicated in individual Specification Sections.
1. Action Submittals: Submit three paper copies of each submittal, unless otherwise indicated. Architect will return two copies. Provide one additional copy for the engineer, if engineer review is required for the specific submittal.
2. Informational Submittals: Submit two paper copies of each submittal, unless otherwise indicated. Architect will not return copies.
3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
5. Test and Inspection Reports Submittals:

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
a. Revise list below to suit Project.
b. Manufacturer's catalog cuts.
c. Manufacturer's product specifications.
d. Standard color charts.

e. Statement of compliance with specified referenced standards.
f. Testing by recognized testing agency.
g. Application of testing agency labels and seals.
h. Notation of coordination requirements.

4. Availability and delivery time information. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams showing factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
   1) A minimum of three paper copies of Product Data, unless otherwise indicated. Architect will return two copies. Provide one additional copy for the engineer, if engineer review is required for the specific submittal;
   2) Remainder quantities will be returned.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:
   a. Number of opaque copies of each submittal:
      1) Architect will retain two copies;
      2) Provide one additional copy for the engineer, if engineer review is required for the specific submittal;
      3) Remainder quantities will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one 3 full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project record sample.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:
   a. Three paper copies of product schedule or list, unless otherwise indicated. Architect will return two copies.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01.

G. Application for Payment: Comply with requirements specified in Division 01

H. Schedule of Values: Comply with requirements specified in Division 01

I. Subcontract list is required by AIA Document A201 to be submitted as soon as practical after award of the Contract. Coordinate with submittal requirements for subcontract list in Procurement Requirements and Contracting Requirements.

J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Submit subcontract list in the following format:
   a. Number of Copies: Three paper copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

K. Coordination Drawings: Comply with requirements specified in Division 01.

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Architect's and the Owner's, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   1. Name of evaluation organization.
   2. Date of evaluation.
   3. Time period when report is in effect.
   4. Product and manufacturers' names.
   5. Description of product.
   6. Test procedures and results.
   7. Limitations of use.

U. Schedule of Tests and Inspections: Comply with requirements when specified in Division 01.

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Y. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

Z. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT / ENGINEEER'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
1. "NO EXCEPTIONS TAKEN": Fabrication, manufacture or construction is to proceed providing the work is in compliance with the Contract Documents.
2. "FURNISH AS CORRECTED": Fabrication, manufacture or construction is to proceed providing the work is in compliance with Architect's markings and the Contract Documents.

3. "REVISE AND RESUBMIT": No work shall be fabricated, manufactured or constructed and Contractor shall make a new submittal to the Architect which conforms to Architect's markings and the Contract Documents. All submissions marked "REVISE AND RESUBMIT" are not permitted on the project site.
4. "REVIEWED": Used where Architect's consultant has previously reviewed submittal. Fabrication, manufacture or construction may or may not proceed, as indicated by consultant's stamp and providing the work is in compliance with the Contract Documents. The "REVIEWED" stamp indicates Architect has reviewed the submittal for non-technical design concept and aesthetic considerations; all markings to be incorporated into the Work.
5. "REJECTED": Used when item submitted is not the item specified in the contract documents.
6. "SUBSTITUTE REVIEW": Used where Architect has reasonable objection submittal as either a substitute or substandard product or system, but has been directed by the Owner to incorporate proposed materials into the Work. Such review indicates the Architect, in his opinion, has determined the submittal does not conform to the requirements of the Contract Documents and, as a courtesy to the Owner, has reviewed the submittal for non-technical design concept and aesthetic considerations only. The Architect disclaims all responsibility for product/system selection. The responsibility for product/system performance rests jointly with the Owner. All markings to be incorporated into the work.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01 33 50 - WARRANTIES

PART 1 GENERAL

1.1 GENERAL

A. Submit warranties for all specific warranties in excess of one year duration required by Specifications Sections. Refer to General Conditions, for additional requirements.
   1. Sample Warranties: Warranty submittals to accompany the related shop drawing submittal. Shop drawing review will not start without warranty submittal nor will they be released for fabrication or installation until sample warranty is approved. See Section 01 33 00 - Submittal Procedures.
   2. At Owner's option, where manufacturer's warranty provisions are not acceptable, the warranty requirement may be rejected and protection for Owner provided under provisions of the Uniform Commercial Code.
   3. Executed Warranties: Submit fully executed warranties as specified under Section 01 77 00 - Closeout Procedures.

B. Warranty Start: Unless otherwise required by the Conditions of the Contract:
   1. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

C. Warranties submitted for approval need not be fully executed with signatures. Signed warranties are required upon completion of the work and subject to restrictions of payment if not received in the required manner or time.

D. Noncompliance with the requirements of this section will place the installing Contractor in default and will entitle the Owner to all rights contained in the Project Manual.

E. The Installing Contractor is responsible for obtaining all executed warranties from suppliers, manufacturers, and subcontractors.

F. Where warranties from subcontractors, suppliers, or manufacturers are limited to materials only, the installing Contractor shall furnish warranties to provide labor required to remove the defective work and install the replacement materials.

G. Any agreement of manufacturer not complying with terms of warranty is not binding on Owner. The Owner shall be entitled to rights of warranties contained in the Project Manual, implied warranties, and all expressed warranties included in manufacturer's advertising.

1.2 PROHIBITED CONTENT

A. The following provisions are not acceptable to the Owner and will be deleted.
   1. Limit of warranty provisions to “original Owner”. Warranty shall be transferable and remain in effect if ownership of property is transferred by sale or other legal means.
   2. Owner’s signature.
   3. Pro-Rated Warranties.
   4. Dollar limits.
   5. Wind speed measured at other than 10 meters above ground level, unless specified otherwise in the Contract Documents.
   6. Wind speed expressed in terms other than mph.

1.3 SAMPLE WARRANTIES

A. Copies of proposed form prepared by manufacturer or, where applicable, by contractor which sets forth the terms of warranty for the work. Sample or proposed warranty forms to be fully representative of final executed warranty.

B. All parties associated with the work must be made known and approved by the prime warranter to preclude claims of unapproved or non-licensed installers, distributors, or contractors. Submittal, as prepared by the prime warranter, must identify the following:
   1. Manufacturer
   2. Contractor
   3. Subcontractor (if any)
   4. Installer
   5. Owner
   6. Job name and address.

1.4 SUBMISSION REQUIREMENTS

A. Sample Warranties:
   1. Schedule submissions of sample warranties to accompany the related shop drawing submission.
   2. Warranties: Submit number of copies of warranties for distribution to the Architect and Owner.
   3. Submit in accordance with requirements of Section 01 33 00 - Submittal Procedures.
   4. Submittals to be stamped by Manufacturer, Contractor, Subcontractor, and Installer as applicable.

B. Final Warranties:
   1. Submit final executed warranties in accordance with Section 01 77 00 - Closeout Procedures.
   2. Submit "Warranty Status Verification" letter for each warranty issued from manufacturers or entities other than Contractors or subcontractors. See WARRANTY STATUS VERIFICATION below.
   3. All warranties and warranty status verification letters associated with a particular aspect of work to be combined in one group and stapled together with cover letter.

1.5 RESUBMISSION REQUIREMENTS

A. Review initial warranty as required and resubmit as specified for initial submittals.
   1. Indicate on warranty any changes which have been made other than those requested by Architect.

1.6 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Make and distribute copies of warranties which carry Architect's review stamp to:
   1. Contractor's file.
   2. Job site file.
   3. Subcontractor or installer.
   4. Manufacturer.

1.7 ARCHITECT'S REVIEW

A. Submittals will be reviewed and treated as a shop drawing. Fabrication or work is not to proceed until warranty submittals are approved by Architect.

B. Review of warranty submittal does not constitute review of product assembly or warranted item.

C. Affix stamp and initials or signature certifying to review of submittal.

D. Return submittals to Contractor for distribution.

1.8 WARRANTY STATUS VERIFICATION

A. Prior to Final Completion and Acceptance, furnish verification from all applicable manufacturers that (1) the warranty(s) issued are indeed in full effect, (2) disclaimers regarding payment have been satisfied, and (3) no disclaimers or limitations not previously approved on Sample Warranty exist.

B. Verification to be on manufacturers letterhead, signed by an officer with binding contractual authority and notarized.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED

END OF SECTION

01 43 39 - MOCK-UPS

1.01 GENERAL

A. Provide labor and material costs associated with a full scale mock-up of a typical guest room in a location to be determined. Architect, Owner and Contractor shall agree on mock-up location.

B. Mock-up to be complete in all respects and show all typical features, materials, components, back-up, and workmanship. Mock-up to establish standards by which completed work is judged. Include work of all trades required in finished work. Maintain mock-up undisturbed until acceptance of Work.

C. Approval of mock-up required before fabrication of remaining work. Make revisions to mock-up until Architect and Owner's approval is obtained.
   1. Revisions required to attain acceptable level of quality to be made at no additional cost to Owner.
   2. Accepted Mock-Up:
      a. May be used as part of completed work.
      b. Becomes standard of quality for remaining work.

1.02 REQUIRED FIELD MOCK-UPS

A. Completed Guest Room Mock-up: Room location to be determined. Include all materials indicated on the Construction Drawings for a finished guest room. Work includes, but not limited to, the following:
   1. General Construction:
      a. Vapor barriers.
      b. Gypsum board
      c. Suspended gypsum board Ceiling
      d. Sealants.
      e. Windows/PTAC grille at exterior
      f. Entrance door to room with hardware.
      g. Interior room doors and trims with hardware.
      h. Glass
      i. Paint
      j. Vinyl wall covering
      k. Tile and base
      l. Carpet and base
      m. Architectural wood trims and accessories
      n. Millwork and counters
   2. Mechanical Construction:
      a. Exhaust grilles.
      b. PTAC unit.
      c. Sprinkler heads.
   3. Electrical Devices:
      a. Power devices.
      b. Tele/com devices.
      c. Light fixtures.
      d. Fire Alarm devices
   4. Plumbing Devices:
      a. Plumbing fixtures

B. Exterior Wall Assembly and Exterior Finishes Mock-ups: Location(s) to be determined. Include all materials indicated on the Construction Drawings for the various finished exterior wall assemblies and exterior finishes. Work includes, but not limited to, the following:
   1. Metal Plate Wall Panels
   2. Manufactured Stone Masonry Veneer
   3. Water Drainage Exterior Insulated and Finish Systems – all colors as indicated on drawings.
   4. Aluminum Storefront and Guestroom Aluminum Windows
      a. Complete install with all flashings
      b. Glazing
   5. Landscape Stacked Stone Walls
   6. Landscape Decorative Concrete Paving

END OF SECTION

01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Requirements of this Section apply to the Work of all other Sections.

B. Section Includes:
1. Standards.
2. Substitutions after Award of Contract.
3. Quality Assurance.
4. Building Equipment/Systems Warranty
5. Delivery, Storage, and Handling.
6. Manufacturers and Types.
7. Metal Gages.
8. Fabrication.
9. Shop Priming.

C. Related Sections:
1. 01 25 00 Substitution Procedures.
2. 01 25 01 Substitution Request Form.
3. 01 33 00 Submittal Procedures.
4. 01 73 00 Execution.
5. 01 77 00 Close-out Procedures.
6. Construction Facilities and Temporary Controls: General Conditions.

1.02 STANDARDS

A. Standards, codes, and regulations published by Manufacturers' associations, governmental agencies and other regulatory authorities form a part of these Specifications as minimum requirements. Such references include the latest issue and all amendments up to 30 days prior to the Bid due date.

B. "Governing Authority" means all federal, state, and local laws and regulations.

C. Where differences occur between the Contract Documents and such standards, the most stringent requirements shall take precedence.

D. Supply all materials and perform all Work in accordance with the Manufacturer's Specifications and installation procedures, and in conformance with published trade and Manufacturers' association standards, unless specifically noted otherwise herein.

1.03 SUBSTITUTIONS AFTER AWARD OF CONTRACT

A. Substitution or approval of products will be considered after award of contract only where unavailability of product is beyond control of Contractor. Unavailability will be construed as being due to strikes, lockouts, bankruptcy, discontinuance of manufacture of product, or Acts of God.

B. Contractor shall place orders and submit shop drawings for specified materials and equipment promptly upon award of contract. No excuse for proposed substitution will be considered for materials and equipment due to unavailability unless proof is submitted that firm orders were placed within 10 days after approval of shop drawings by Architect of the item listed in project manual.

C. Requests for substitutions to be made in writing to Architect within 10 days of date Contractor ascertains the specified material or equipment is unavailable.

D. Requests for substitutes to be accompanied by complete description of material or equipment. Provide all information requested by Architect for evaluation including samples if requested.

1.04 QUALITY ASSURANCE

A. Qualifications:
   1. Wind Load: Provide products designed to withstand the indicated wind load or greater load if required by Code; when requested, submit substantiating data.
   2. Fire Resistance Rating:
      a. Provide materials and assemblies which have been tested and listed by UL, FM, or other recognized authority, for the assembly shown or specified; where specified, attach label of testing authority.
      b. For oversized assemblies or assemblies similar to those tested, provide Manufacturer's certification that the assembly has been constructed of materials and methods equivalent to the tested construction.
   3. Flame Spread Rating:
      a. Provide products with the indicated flame spread rating or less; when requested, submit substantiating data.
      b. Provide materials with flame spread rating required by code, unless a more stringent requirement is specified.
   4. Proprietary Products:
      a. Where systems or assemblies of materials or equipment are indicated, obtain all primary components from the same Manufacturer, unless specifically noted otherwise.
   5. Qualifications of Subcontractor:
      a. Submit satisfactory evidence that Subcontractor has a minimum of 5 years' successful experience in Work similar to the Work and Scope of this Contract.
      b. Subcontract the Work to a firm licensed, franchised or otherwise approved by the Manufacturer.

B. Field Quality Control:
   1. Manufacturer's Field Representative:
      a. When indicated, send a qualified technical representative to the Site to advise on the proper installation of the product.
   2. Mock-up and Test Surface:
      a. Where indicated, construct a field mock-up or sample panel, using materials, finishes, colors, jointing fasteners, and methods of installation proposed for the Work.
      b. When applying materials as a finish or protective coating to other surfaces, apply to a test surface of the actual base material.
      c. Do not proceed without Architect's approval.
   3. Field Measurements:
      a. Make field measurements wherever possible for accurate fabrication of built-in or attached products.
      b. Do not delay job progress. Allow for trimming where field measurements cannot be made prior to fabrication
   4. Layout:
      a. Establish bench marks and layouts as required. Extend these lines up through the Building as the Work progresses. Each Subcontractor shall lay out his Work from these references.

1.05 TESTS, INSPECTIONS, AND APPROVALS

A. See Section 01 73 00 - Execution.

1.06 INFORMATION REQUESTS

A. See Section 01 73 00 - Execution.

1.07 NON-CONFORMING WORK

A. See Section 01 73 00 - Execution.

1.08 DELIVERY, HANDLING, AND STORAGE

A. General: Deliver, store, and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

B. Delivery:
1. Schedule delivery to minimize long-term storage at site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged or sensitive to deterioration, theft, and other losses.
3. Deliver products to site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels, and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to en sure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:
1. Store products at site in a manner that will facilitate inspection and measurement of quantity or counting of units.
2. Store heavy materials away from Project structure in a manner that will not endanger supporting construction.
3. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity with range required by manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND TYPES

A. In many instances this Project has been designed around a specific Manufacturer. In some Sections of this Specification, other Manufacturers are listed as acceptable. Equipment from these Manufacturers will be accepted contingent upon meeting the design, appearance and functional standards established by the specified items. If an acceptable Manufacturer requires changes; Electrically, Mechanically, Structurally, from what is shown on the Drawings, it shall be the responsibility of the supplier or Contractor requiring such change, to pay all the costs involved with no additional cost to the Owner.

B. Where more than 1 Manufacturer or product designation is listed, provide any one named. NO SUBSTITUTIONS will be permitted after signing the Contract.

C. Where only 1 Manufacturer is listed in the Contract Documents or only 1 Manufacturer is available at the time for ordering materials, either provide that product or submit the name of another Manufacturer for review and approval by the Architect and Owner. Such request shall be submitted by the Change Order process only. Submit all documentation required elsewhere in the Contract Documents and as required by the Architect/Owner to show proof that the submittal is an equal in every respect to the item specified.

E. Where a performance is specified and no Manufacturer is listed, submit through the Shop Drawing procedure the name of the Manufacturer, the product proposed, and detailed information showing its characteristics. Such proposal shall meet the Specification, line item by line item, or will be rejected.

F. Where a choice of color, pattern, or texture is available for a specified product or item of equipment, the Architect/Owner will make a selection from the Manufacturer's highest or best standards, unless noted otherwise in the specification sections of Divisions 2 through 16 of the Project Manual. All such choices will be listed in the Color Schedule, except that choices indicated on the drawings or in the specifications (i.e.: color and texture of precast concrete) may not be repeated in the Color Schedule.

2.02 METAL GAGES

A. Unless noted otherwise, metal thickness specified by gages without decimal equivalents to be based on standards referenced below.

B. Carbon Steel: U.S. Standard Gage as published in AISI Manual of Steel Construction, 9th Edition. Gages specified, but not listed, to comply with referenced standard.
1. 12 gage: 0.1046 inch.
2. 14 gage: 0.0747 inch.
3. 16 gage: 0.0598 inch.
4. 18 gage: 0.0478 inch.
5. 20 gage: 0.0359 inch.
6. 22 gage: 0.0299 inch.
7. 24 gage: 0.0239 inch.
8. 26 gage: 0.0179 inch.
9. 28 gage: 0.0149 inch.

C. Other Metals: Architectural Sheet Metal Manual by SMACNA, 5th Edition, 1993.

D. Thickness indicated is base metal, exclusive of coatings.

2.03 FABRICATION

A. Fabricate all items in the shop insofar as possible. Where items cannot be completely shop-fabricated and assembled for shipment, assemble and fit in shop, disassemble and ship. Identify parts for field assembly.

B. Fabricate items to be straight, square, in proper alignment, and with hairline joints where joints are necessary. Pre-plan field joints to be as inconspicuous as possible.

2.04 SHOP PRIMING

A. Shop prime or seal surfaces of all products to receive paint materials in accordance with the requirements in the Painting Section of these Specifications.

B. Apply a primer or sealer compatible with the specified paint materials.

C. In the event such primer is determined to be incompatible with the specified paint materials, provide a barrier coat or remove the primer and re-prime as directed.

END OF SECTION

SECTION 01 73 00 - EXECUTION

PART 1 GENERAL

1.01 SUMMARY

A. Requirements of this Section apply to the Work of all other Sections.

B. Section Includes:
1. Safety.
2. Tests, Inspections, and Approvals.
3. Information Requests.
4. Non-Conforming Work.
5. Erection.
6. Examination of Substrate.
7. Preparation.
8. Installation.
9. Workmanship.
10. Protection.
11. Overhead Attachments.
12. Prohibited Materials and Methods

C. Related Sections:
1. Section 01 33 00 Submittal Procedures.
2. Section 01 77 00 Close-out Procedures.

1.02 SAFETY

A. Safety and supervision of construction procedures are Contractor's responsibility as stated in General Conditions. Neither the Architect nor his consultants claim expertise in, and take no responsibility for, construction means and methods or job site safety during construction. Processing and/or approving submittals made by Contractor which may contain information related to construction methods or safety issues, or participation in meetings where such issues might be discussed must not be construed as voluntary assumption by the design professional of any responsibility for safety procedures.

1.03 TESTS, INSPECTIONS, AND APPROVALS

A. Perform or arrange for all inspections, tests, and approvals required in each specification section of Divisions 2 through 33 by governing authority.

B. Pay all costs unless specifically stated otherwise in the specification sections of Divisions 2 through 16.

C. Notify each inspecting authority and the Architect 24 hours in advance of each test, inspection and approval.

D. Keep records of each test, inspection and approval. Include the time, weather conditions, name of inspecting, testing, or approving authority, results of the test, and all other pertinent data.

E. Submit official reports showing dates performed, test methods, results, interpretations of results, and recommended actions. Submit required copies to governing authorities and Architect.

F. Provide required certificates to the Architect for the Owner's file.

G. If the Architect, Owner, or Contractor determines that any Work requires special inspection, testing, or approval, he will, upon written authorization from the Owner, instruct the Contractor to order such special inspection, testing, or approval.
1. If such special inspection, testing, or approval process reveals a failure of the Work to comply

with the requirements of the Contract Documents, the installing Contractor shall bear all costs thereof, including compensation for additional services of the Architect; otherwise, the Owner shall bear such costs, and an appropriate Change Order shall be issued.

1.04 INFORMATION REQUESTS

A. Construction Questions: Questions which arise during construction concerning construction procedures, Contract Document information, and minor deviations to accommodate construction shall be submitted by the Contractor in writing, accompanied by the proposed solution.
   1. Questions concerning interpretation of Contract Documents or minor deviations which affect design, appearance, or function shall be forwarded to the Architect, through the Contractor, for his comments.
   2. Questions concerning construction means and methods, minor deviations to accommodate construction which do not affect design, appearance, code compliance, or function, and questions that can be answered by review of the Contract Documents shall not be the Work of the Architect.

B. Deviations: Questions concerning proposed deviations from the Contract Documents which affect design, appearance, or function shall be documented by the Contractor and submitted to the Architect for his review.
   1. Such documentation shall include detailed Drawings and written substantiation for the proposed deviation. This shall not be construed as a means of substituting materials or systems.
   2. NO SUBSTITUTIONS OF MATERIALS OR SYSTEMS ARE PERMITTED UNDER TERMS OF THIS PARAGRAPH.
   3. Do not proceed with such deviations until written notice to proceed has been received from the Architect. Such written notice shall not relieve the Contractor from conformance to the Contract Documents.
   4. If requests for deviations are, in fact, requests for substitutions, the reviews of the Architect shall be paid by the contractor making the request, even though the request is denied, as set forth in NON-CONFORMING WORK below.

1.05 NON-CONFORMING WORK

A. Faulty work or work not in conformance with the Contract Documents will not be permitted by the Architect.
   1. It is the responsibility of the installing Contractor to propose a remedy by means of detailed drawings and written documentation and submit such documentation to the Architect for his comments.
   2. All costs for the removal and reconstruction of such Work, as well as additional services of the Architect, shall be paid for by the installing Contractor.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

3.01 ERECTION

A. The structure is designed to be self-supporting and stable after building is fully completed. Contractor is solely responsible to determine erection procedure and sequence and to ensure the stability of the building and its component parts and the adequacy of temporary or incomplete connection during erection, including providing of temporary bracing, guys, or tie-downs as necessary. Such temporary material is not shown on the drawings. Remove such temporary material as conditions permit as directed by the Contractor.

3.02 EXAMINATION OF SUBSTRATE

A. Examine the substrate or structure to which a product is to be applied or installed. Do not proceed until unsatisfactory conditions have been corrected. Starting the Work indicates acceptance of conditions and the installer assumes full responsibility for results.

B. Check the substrate or structure for proper clearances and tolerances. Tolerances may be listed under individual Sections.

3.03 PREPARATION

A. Substrate: Where products are applied to a substrate, prepare the substrate as recommended by the product Manufacturer, generally as follows:
   1. Bring substrate to a uniform surface by smoothing uneven surfaces and filling holes, cracks and low places with recommended filler or parent material.
   2. Floor Transitions: Provide underlayment as needed for transition to thicker floor coverings. Use recommended filler or parent material. Slope not to exceed 1/8 inch in one foot.
   3. Depressed Slabs: Bring substrate to required elevation to receive finish materials where finish materials cannot completely fill depression. Use approved cementitous filler or parent material. Coordinate depressed slab locations with finish material locations.
   4. Remove substances, such as dust, oils and other foreign matter, not compatible with the product.
   5. Surfaces shall be dry, unless a moisture content or wetting is specified.

B. Concrete Slabs: Provide steel shot abrasive cleaning of concrete slabs receiving designated finish flooring materials.
   1. Designated Finish Flooring Materials:
      a. Cementitious or cementitious set materials.
      b. Sheet and resilient tile flooring materials.
      c. Waterproofing materials.
      d. Paint materials.
      e. Polymer seamless flooring.
   2. Equipment: "Blastrac" by Wheelabrator Corp., 800/544-4144, or approved equal. Electric powered portable unit with self-contained dust collection system. Size(s) of unit(s) and shot media suitable for conditions and proposed finish materials.
   3. Cleaning: Remove concrete surface to sufficient depth to remove bond breakers and contaminants such as curing compounds, oils, and other foreign matter which may be detrimental to the completed flooring installation.
      a. Work smoothly and evenly over entire surface; avoid creating dips, ridges, or other imperfections which would show in the completed installation.
      b. Small transitions for different flooring materials may be effected by multiple passes if carefully executed to create smooth even slope of not more than 1/8 inch in two feet.
   4. Repair: Repair defects in surface caused by cleaning process.
      a. Grind ridges and fill or patch depressions with approved products as needed to bring substrate to surface acceptable for the finish floor covering.
      b. Defects and repairs, if any, shall not show nor be detrimental to the completed floor covering work.
   5. Clean floor as near as possible to flooring installation to avoid contamination from work of other trades. Protect cleaned floor from soiling with suitable sheet materials. Reclean soiled areas.

C. Inserts and Anchorages:
   1. Anchorages where not detailed are the responsibility of the installer to design a suitable connection, structurally sound, and aesthetically acceptable to the Architect. Furnish calculations, drawings, product data when requested by Architect. Such information may, or may not, be returned as indicated under Section 01332 - Shop Drawings, Product Data & Samples.
   2. It is the responsibility of the installer to furnish built in fastening devices for his product to the

proper trade for installation as the Work proceeds.

3. In the event such devices are not furnished in time to be built in, it is the installer's responsibility to provide other methods for attaching his product. Submit Drawings and other required data to the Architect/Owner for his file.

D. Templates: Provide templates, diagrams and other coordinating documents to the proper Contractor, Manufacturer, or supplier of related items affecting the Work.

E. Dimensions:

1. If the exact location of an item is not indicated by dimension on the Drawings or noted in the Specifications, the Architect reserves the right to determine such location in the field prior to roughing in.
2. If the exact dimensions of a product are not indicated or shown, the Architect reserves the right to determine dimensions prior to ordering or fabricating the product.
3. Such dimensional changes shall not be a basis for changes in the Contract Sum.
4. Where miscellaneous devices, such as thermostats, switches, controls, grilles, pipes, or outlets of any nature are not exactly located by the Contract Documents, request such location or obtain approval of the location prior to installation. If approval has not been obtained, the Architect may direct the relocation of such devices at the expense of the installer.

3.04 INSTALLATION

A. Install products in accordance with the Manufacturer's recommendations or the requirements of trade associations, listed standards, Shop Drawings, and Contract Documents.

B. Where a conflict exists between these references, the most stringent requirements govern. If printed instructions are not available, consult with the Manufacturer's field representative.

C. Provide hangers, auxiliary framing, and other means for installing ceiling suspension systems, lighting fixtures, diffusers, and other equipment in ceilings to avoid ducts, piping, etc.

D. Suspend from structural members, such as joists or beams, and not from ducts or piping.

E. Install Work in a manner which will not interfere with the proper installation of the Work of other trades.

F. Install Work in a manner to facilitate operating, servicing, and repairing.

3.05 WORKMANSHIP

A. Install products straight, plumb, level, and in line. Securely attach items to the substrate, using recommended adhesives, mechanical fasteners or other devices. Where holes are provided for attachment, do not field drill or cut new holes without the approval of the Architect.

B. Match all finished Work to the approved submitted Samples or approved Sample panels.

C. Conceal fasteners wherever possible, unless exposed fasteners are permitted or specified.

D. Weld in accordance with AWS standards for qualifications of operators and for workmanship.

E. Finish of Access Openings: Openings into concealed or service spaces to be finished free of projections, obstructions, sharp edges or other irregularities which hinder free and safe access. Opening includes the full thickness of construction in which the opening is located plus attached materials.

F. Ease sharp edges of exposed work to minimize possibility of injury to persons.

3.06 PROTECTION

A. Protect finished surfaces of product being installed and surrounding products from damage during installation. Provide protective devices as required and as recommended by the Manufacturer.

Cover Work subject to damage at the end of each day's Work.

B. Coat concealed surfaces of metal products with a bituminous or other approved coating to prevent contact between dissimilar metals or other material which can cause deterioration.

C. Correct damage by repairing or replacing as directed by the Architect. Repairing will be permitted only where the repair is undetectable and does not cause structural damage or interfere with proper functioning of the part.

D. Protect finish of installed products, including tub/shower receptors and all plumbing fixtures until Substantial Completion of the Project by use of wrappings, covers, or other approved protective devices to maintain integrity of factory finishes. Remove such protection immediately prior to final cleaning.

3.07 OVERHEAD ATTACHMENTS

A. For required hangers each trade to provide one or more of the following:
   1. Concrete inserts prior to placement of concrete.
   2. Trapeze from adjacent structure with suitable steel framing.
      a. Connections to Structure: Suitable anchorage devices with a minimum load carrying capacity of 250 lbs. plus a safety factor of 4:1 for the applied load: Concrete: Steel expansion anchors. See PROHIBITED MATERIAL & METHODS below.
      b. Steel: Bolted or welded connections to steel structure.

B. Where metal deck is furnished with hangar tabs or similar devices, applied total load, including work of other trades, not to exceed 75 lbs. for each device. Loads in excess of permitted limit to be supported by trapeze framing as specified above.

C. Verify support requirements of heavy or unusual loads not specifically shown on drawings with Architect.

3.08 PROHIBITED MATERIALS AND METHODS

A. The following items are expressly prohibited:

B. Attachment Related Items:
   1. Ballistic Fasteners: Ballistic fasteners are defined as anchors which are driven into place by any device which produces an impact force by use of a powder charge, compressed air, gas or any other propellant. Ballistic fasteners prohibited for the following conditions:
      a. Attachment of structural members.
      b. Where public may be endangered by misuse.
   2. Suspension systems which are not independently supported:
      a. Ceiling grid systems shall not be supported from ductwork, electrical conduit, heating or plumbing lines, and vice versa.
      b. Each utility system and the ceiling grid system shall be a separate installation and each shall be independently supported from the building structure.
      c. Where interference occurs, provide trapeze type hangers or other suitable supports for each system.
      d. Locate hangers and supports where they will not interfere with access to mixing boxes, fire dampers, valves, and other appurtenances requiring servicing.
      e. See OVERHEAD ATTACHMENTS above.
   3. Plug anchorage by use of wood, lead, or plastic.
   4. Perforated steel strap iron for pipe or other support or anchorage.

C. Methods Related Items:
   1. The penetration of floors and of walls by pipes, ducts, or other penetrations unless openings are appropriately fire stopped by fire doors, or fire dampers, and voids around pipes, ducts, conduits, etc. are sealed with fireproof materials.
   2. The use of ink marking pens on surfaces of any kind of materials receiving paint or other

finish in exposed location.

3. Use of jack hammers or other similar equipment which can cause structure-borne vibration detrimental to the use of the existing facilities.

D. Materials Related Items:
   1. Asbestos.
   2. Barbed wire in construction fencing.
   3. Water soluble treatment of insulation jackets or facing, to impede or retard flame or smoke.

E. Earthwork Related Items:
   1. Use of explosives or blasting as a constructing practice is prohibited except as specified in Section 02319 – Rock Excavation and for special cases of demolition. Blasting shall only be utilized when approved in writing by the Owner.
   2. Sand, small gravel, or similar flowable material as backfill; material must be stable when future excavation removes containment. Exceptions: Specified drainage and wall fill at required locations.

END OF SECTION

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous construction waste.
2. Recycling nonhazardous construction waste.
3. Disposing of nonhazardous construction waste.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.
2. Division 04 Section "Manufactured Stone Masonry" for disposal requirements for excess stone and stone waste.
3. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Construction Waste:

a. Site-clearing waste.
b. Masonry and CMU.
c. Lumber.
d. Wood sheet materials.
e. Wood trim.
f. Metals.
g. Roofing.
h. Insulation.
i. Carpet and pad.
j. Gypsum board.
k. Piping.
l. Electrical conduit.
m. Packaging: Regardless of salvage/recycle goal indicated in paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.
5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. LEED Submittal: LEED letter template for Credit MR 2.1, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

H. Qualification Data: For waste management coordinator.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of Projects with similar requirements, that employs a LEED Accredited Professional, certified by USGBC, as waste management coordinator. Waste management coordinator may also serve as LEED coordinator.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01. Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements of this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. Provide names and telephone numbers of local recycling receivers and processors of recyclable materials.

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

D. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

E. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

1. Comply with requirements in Division 32 for use of chipped organic waste as organic mulch.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

a. Comply with requirements in Division 32 for use of clean sawdust as organic mulch.

D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

a. Comply with requirements in Division 32 for use of clean ground gypsum board as inorganic soil amendment.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials and dispose of at designated spoil areas on Owner's property.

D. Disposal: Transport waste materials off Owner's property and legally dispose of them.

3.5 ATTACHMENTS

A. Form CWM-1 for construction waste identification.

B. Form CWM-3 for construction waste reduction work plan.

C. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.

D. Form CWM-7 for construction waste

END OF SECTION

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FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION

MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED* (A)	EST. WASTE - % (B)	TOTAL EST. QUANTITY OF WASTE* (C = A x B)	EST. VOLUME CY	EST. WEIGHT TONS	REMARKS AND ASSUMPTIONS
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

* Insert units of measure.

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FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN

MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS	EST. AMOUNT RECYCLED TONS	EST. AMOUNT DISPOSED TO LANDFILL TONS	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

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FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN

MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

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FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS	ACTUAL TONS (B)	ESTIMATED TONS	ACTUAL TONS (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 GENERAL

A. Related Sections:
   1. Submittals required for administration of the Contract and during the course of construction:
      a. Section 01 33 00 - Submittal Procedures.
      b. Section 01 33 50 - Warranties.
      c. Section 01 78 39 - Project Record Documents.

B. Description: Each Contractor shall furnish labor, materials, and submittals of data required prior to acceptance of the Work by the Owner.

C. Submittals: All items delivered or submitted to Owner or Architect to be accompanied by a properly executed transmittal listing all item being submitted.

1.02 DEFINITIONS

A. Close-out: General requirements near end of Contract Time, in preparation for final acceptance, final payment, normal termination of Contract, occupancy by Owner and similar actions evidencing completion of the Work. Specific requirements for individual units of Work are specified in sections of Division 2 through 33. Time of close-out is directly related to "Substantial Completion" and therefore may be either a single time period for entire Work or a series of time periods for individual parts of the Work which have been certified for Substantial Completion at different dates. That time variation (if any) shall be applicable to other provisions of this section.

1.03 PREREQUISITES FOR SUBSTANTIAL COMPLETION

A. Prior to requesting Architect's inspection for Certification of Substantial Completion (for either entire Work or portions thereof), complete the following and list known exceptions in request:
   1. Progress Payment Request:
      a. In progress payment request coincident with or first following date claimed, show either 100% completion for portion of Work claimed for Substantial Completion, or list incomplete items, value of incompletion, and reasons for being incomplete.
      b. Include supporting documentation for completion as indicated in these Contract Documents.
      c. Submit statement showing accounting of changes to the Contract Sum.
      d. Submit Contractors completed Punch List to Owner’s rep and Architect for review.
   2. Cleaning: For special cleaning methods required by specific materials, see applicable technical specification. Maintain premises and public properties free from accumulations of waste, debris, and rubbish caused by construction operations. At completion of the Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave the Work clean and ready for inspection.
   3. Submit record drawings, operation and maintenance manuals, substantial completion project photographs, and similar record information. See "Related Sections" under GENERAL above.
   4. If requested by Owner, change-over of locks from construction cores to permanent cores.
   5. Warranties: Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents. See Section 01335 - Warranties.
   6. Demonstration and instruction of equipment and systems to designated Owner personnel.

1.04 PREREQUISITES TO FINAL ACCEPTANCE

A. General: Prior to requesting Architect's final inspection for Certification of Final Acceptance and final payment, as required by General Conditions, complete the following and list known exceptions (if any) in request:
   1. Waiver of Liens.
   2. Pay Request: Submit the following:
      a. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
      b. Updated final statement, accounting for additional (final) changes to Contract Sum.
   3. Inspection List: See Project Close-out.
   4. Utilities/Fuel: Submit final meter readings for utilities, measured record of stored fuel, and similar data as of time of Substantial Completion or when Owner took possession of and responsibility for corresponding elements of the Work.
   5. Insurance:
      a. Submit consent of surety.
      b. Advise Owner of pending insurance change-over requirements.
      c. Revise and submit evidence of final, continuing insurance coverage complying with insurance requirements.
   6. Obtain and submit releases enabling Owner's full and unrestricted use of the Work and access to services and utilities, including (where required) occupancy permits, operating certificates, and similar releases.
   7. Submit final project photographs; revisions to record drawings, if any; revisions to previously submitted records, if any, and similar final record information not previously submitted. See "Related Sections" under GENERAL in Part 1 above.
   8. Deliver to Owner tools, spare parts, extra stocks of materials, and similar physical items specified under appropriate sections of the specifications.
   9. Change-over of locks from construction cores to permanent cores. Coordinate hardware with Owner to change locks, if necessary, for Substantial Completion.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

3.01 PROJECT CLOSE-OUT

A. Inspection List: After receipt of written notice that the Work is complete and ready for acceptance by the Owner, and after receipt of the final application for payment, the Architect will verify its conditions and issue a Certificate of Substantial Completion with a inspection list of any uncompleted or unacceptable items appended to it and establishing the Date of Substantial Completion.

B. Final Completion and Acceptance: Contractor shall make correction of all items noted in inspection list within 30 days after receipt of inspection list. The Architect will verify the completion or correction of items noted on the inspection list and, when he finds the Work acceptable under the Contract Documents, will issue a final Certificate of Payment stating that to the best of his knowledge, information and belief and on the basis of his observations the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance found due the Contractor, and noted in said Certificate, is due and payable. Architect will inspect status of items on Inspection List one time at his cost.

3.02 OWNER OCCUPANCY BEFORE FINAL ACCEPTANCE

A. Upon Substantial Completion: When Owner desires to take full or partial occupancy upon Substantial Completion, complete the following list in addition to PREREQUISITES FOR SUBSTANTIAL COMPLETION. Owner will give 30 days prior notice of intent to take occupancy and describe which areas will be occupied if not full occupancy.
   1. Waiver of Liens.
   2. Inspection List: See Project Close-out.
   3. Utilities/Fuel: Submit final meter readings for utilities, measured record of stored fuel, and similar data as of time of Substantial Completion or when Owner took possession of and responsibility for corresponding elements of the Work.
   4. Insurance:
      a. Submit consent of surety.
      b. Advise Owner of pending insurance change-over requirements.
      c. Revise and submit evidence of final, continuing insurance coverage complying with insurance requirements.
   5. Obtain and submit releases enabling Owner's full and unrestricted use of the Work and access to services and utilities, including (where required) occupancy permits, operating certificates, and similar releases.
   6. Submit final project photographs; revisions to record drawings, if any; revisions to previously submitted records, if any, and similar final record information not previously submitted. See "Related Sections" under GENERAL in Part 1 above.
   7. Deliver to Owner tools, spare parts, extra stocks of materials, and similar physical items specified under appropriate sections of the specifications.
   8. Change-over of locks from construction cores to permanent cores. Refer to Section 08710 - Finish Hardware if not previously directed by Owner to change locks for Substantial Completion.
   9. Complete final cleaning up requirements for areas designated for occupancy, including touch up of marred surfaces.

B. After Substantial Completion and Before Final Acceptance: When Owner desires to take full or partial occupancy after Substantial Completion but before Final Acceptance, complete the following list in addition to PREREQUISITES FOR SUBSTANTIAL COMPLETION. Owner will give 30 days prior notice of intent to take occupancy and describe which areas will be occupied if not full occupancy.
   1. Same as “Upon Substantial Completion” above.

C. Where Final Acceptance is not achieved within 45 days after Substantial Completion, complete all items listed below unless a longer time period is acceptable to Owner.
   1. Same as “Upon Substantial Completion” above.

3.03 RECORD DOCUMENTS

A. Refer to Section 01 78 39 - Project Record Documents.

3.04 EQUIPMENT

A. Final Maintenance:
   1. Lubrication: Lubricate all operating equipment in accordance with manufacturer's instruction; provide all oil, grease, and other materials and methods required for preparation of equipment for satisfactory operation.
   2. Filters: Replace all filters with new filters of proper type and size.
   3. Clean, adjust and perform work required to bring equipment into appearance and functioning capabilities of new equipment operating properly.

B. Start-Up: Start up all equipment and test run for sufficient time to demonstrate operation and capacity of equipment; adjust as required for operation satisfactory to Owner.

3.05 OPERATING AND MAINTENANCE INSTRUCTIONS

A. The Contractor shall thoroughly instruct and supervise the designated Owner Personnel in the proper operation and maintenance of the equipment and finishes. The Contractor shall be responsible for arranging for the instruction and supervision at a time convenient to the Owner. Equipment systems requiring instruction include the following:
   1. Plumbing, HVAC, Fire Protection, and Electrical Equipment.
   2. Architectural Equipment: Include, but not limited to, elevators, window washing equipment, operable walls, demountable partitions, fire extinguishers.

B. Instructions shall include the following:
   1. Location of equipment and explanation of what it does.
   2. Reference to "Operating Instruction Manuals" for record and clarity.
   3. Coordination of written and verbal instruction so that each is understood by all personnel.
   4. Explanation of Temperature Control System including panels.
   5. Specific maintenance to be performed by Owner.
   6. Assembly and disassembly of demountable or relocatable equipment, if any, such as demountable partitions.

C. Instruction Personnel: Contractor to provide instruction personnel as follows:
   1. Primary System or Major Equipment Items: Manufacturer's representative.
   2. Secondary Equipment or Systems: Manufacturer's Representative or installing subcontractor as suitable.
   3. Other Items: Installing Subcontractor.

D. Instruction Verification: Contractor to furnish form for Owner's representatives' signature following each instruction period. Where instruction is insufficient, Owner may decline to sign and additional instruction to be furnished to Owner's satisfaction.
   1. Form to indicate the following:
      a. Instruction topic(s).
      b. Date.
      c. Approximate duration of instruction period.
      d. Instructor.

3.06 FINAL CLEANING

A. At completion of the Work, employ experienced workers or professional cleaners for final cleaning immediately prior to acceptance or occupancy by the Owner.
   1. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces.
   2. Clean all glass, including aluminum storefront and aluminum window units, both sides, including lighting fixture lenses and mirrors, and polish.
   3. Vacuum walls, floors and ceilings.
   4. Repair, patch and touch-up marred surfaces to match adjacent surfaces.
   5. Broom clean and power wash paved surfaces and rake clean other surfaces of grounds; remove snow and ice from access to the Work.
   6. Clean ducts, blowers and coils and replace filters. Coordinate with requirements as specified under Section 01 81 13 Sustainable Design Requirements.
   7. Dust and clean all counters, shelves and cabinets, inside and out; clean and polish all metal trim.

3.07 WARRANTIES

A. Warranties covering the entire Work are included in the General Conditions. Additional warranties, if any, are described in the appropriate sections of the technical specifications.

B. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items

put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

C. Verify that documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Retain warranties and bonds until time specified for submittal.

F. Include photocopies of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

01 78 23 - OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Operation and Maintenance Manuals for:
   1. Architectural.
   2. Plumbing.
   3. Fire Protection.
   4. HVAC.
   5. Building Automation.
   6. Electrical.

1.02 GENERAL REQUIREMENTS

A. Provide Maintenance Manuals as specified herein.

B. Responsibility: Each Contractor shall furnish preliminary and finished "Operation and Maintenance Manuals" for work under his Contract as indicated below.

C. Preliminary Review Copy:
   1. One copy required.
   2. Forward copy not less than 60 days prior to scheduled completion of the work for review by the Architect and the Owner.
   3. Obtain approval prior to producing final copies.
   4. Preliminary copies must conform with all requirements for final copies, except that intended layouts for covers may be submitted in lieu of finished covers.

D. Finished Copies.
   1. Two hard copies and one electronic copy required.
   2. Deliver completed manuals to Architect not more than 30 days prior to scheduled completion of the Work.
   3. The Architect will then transmit the manuals to the Owner after review and approval.

E. Contents: Each manual shall contain operation and maintenance instructions, maintenance data, complete parts lists, shop drawings or catalog cuts, and other data listed herein as furnished by the manufacturer, for all systems and equipment provided in the Contract, unless otherwise approved.
   1. When necessary, furnish supplemental drawings and/or diagrams to show system operation and servicing or maintenance points.
   2. Furnish data in clean, neat, legible copies with all drawings accordion folded; do not include inapplicable information and advertising.

1.03 FORMAT/ASSEMBLY

A. Binder: 8-1/2" x 11" hard-back binder. All material bound in binder.

B. Text: Except for drawings, all text to be typed or machine printed.

C. Furnish each copy with index and tabbed dividers between equipment categories.

D. Each division of work to be indexed and marked.

E. Assemble material as follows:

1. Cover:
   a. Front: Imprint covers with the name of the project, name of the equipment manual (i.e. Architectural, HVAC, Equipment Manual) Owner's name, and year of completion.
   b. Spine: Imprint with name of equipment manual for ease of identification on shelf; see "Front" above.
2. Inside Cover: Title of job, address, date of submittal, name of architect, engineer, contractor and name of manufacturer.
3. Second page: Index.
4. Third page: Introduction to first section containing a complete written description of the equipment or system.
5. First Section: Written description of system contents, where equipment is located in building, how each part functions individually and how system works as a whole, concluded with a list of items requiring service and the service needed or reference to the manufacturer's data in the binder which describes proper service.
6. Second Section: A copy of each shop drawing with an index at the beginning of the section.
7. Third Section: A copy of manufacturer's operating instructions with an index at the beginning of the section.
8. Fourth Section: A list of all equipment used on the job, contractor's purchase order numbers, supplier's name and address.

1.04 ARCHITECTURAL EQUIPMENT, FINISHES AND FINISH MATERIALS MANUAL

A. List all finish materials, equipment and finishes installed in the Work.

B. Include manufacturers' names and model numbers, proportions of mixes, finish numbers or designations, and all other pertinent information that might be required for replacement ordering or duplication at a later date.

C. List items in order of how specified on typewritten 8-1/2" by 11" pages.

D. Finishes: For each item, include cleaning and maintenance instructions for proper care of finish.
   1. Include recommended schedule for maintenance.
   2. Include precautions against materials and methods which may be detrimental to finishes and performance.

E. Equipment: For each item, include operating and cleaning/maintenance instructions, detailed lubrication instructions, parts listing, recommended parts inventory listing, purchase source listing, copy of warranties, and similar applicable information.
   1. Equipment involving electric devices to include complete wiring diagrams; voltage, amperage, fuse description where applicable, motor sizes and description of other electric devices.
   2. Equipment involving plumbing features, piping or related devices to include piping diagrams, pipe sizes, washer/gasket part listing.

1.05 PLUMBING, FIRE PROTECTION, HVAC, AND BUILDING AUTOMATION EQUIPMENT MAINTENANCE MANUALS

A. In addition to General Requirements above, Maintenance Manuals to contain the following:
   1. Description of systems.
   2. Manufacturers' names, nearest Factory Representative and Model and Serial numbers of components of systems.
   3. Operating instructions, start-up and shut-down procedures.
   4. Maintenance and lubrication instructions. Include routine and emergency service information for each system.
   5. Servicing instructions.
   6. Parts list with numbers of replaceable items, including sources of supply.

7. Manufacturer's literature describing each piece of equipment.
8. One final approved copy of each shop drawing submitted.
9. Temperature control diagrams.
10. Valve charts.
11. Belt sizes, types, and lengths.
12. Wiring diagrams.
13. Copies of written warranties; original warranties submitted under Section 01 77 00 - Closeout Procedures.
14. Testing and balancing reports, approved copy.
15. Routine and 24 hour emergency service/repair information:
    a. Name, address and telephone number of servicing agency.
    b. Names of personnel to be contacted for service arrangements.

1.06 ELECTRICAL EQUIPMENT MANUALS

A. In addition to General Requirements above, Electrical Equipment Manual to contain the following:
1. Description of systems.
2. Manufacturers' names, nearest Factory Representative and Model and Serial numbers of components of systems.
3. Operating instructions, start-up and shut-down procedures.
4. Maintenance instructions. Include routine and emergency service information for each system.
5. Servicing instructions.
6. Parts list with numbers of replaceable items, including sources of supply.
7. Manufacturer's literature describing each piece of equipment.
8. One final approved copy of each shop drawing submitted.
9. Wiring diagrams.
10. One typewritten directory for each panelboard.
11. Copies of written warranties; original warranties submitted under Section 01 77 00 - Closeout Procedures.

END OF SECTION

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section specifies administrative and procedural requirements for Project Record Documents to be prepared and submitted by the General Contractor.

2. Project Record Documents required include:

a. Marked-Up Copies of Record Drawings, Specifications, and Product Data

b. Record Samples

c. Miscellaneous Record Submittals

B. Related Sections:

1. General project closeout requirements are included in “Contract Closeout”, Section 01 77 00.

2. General requirements for submittal of Shop Drawings and Product Data are included in General Conditions and the Section “Submittals and Substitutions,” Section 01 33 00.

3. Specific record copy requirements that expand requirements of this Section are included in the individual Sections of Divisions 02 through 33.

4. Operating and maintenance data is specified in Section 01 78 23.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Refer to 00 72 13 General Conditions.

1.03 RECORD DRAWINGS

A. The Contractor shall maintain a white-print set (blue-line or black-line) of Contract Drawings and Shop Drawings in clean, undamaged condition, with mark-up of actual installations which vary substantially from the work as originally shown. Mark whichever drawing is most capable of showing "field" condition fully and accurately; however, where Shop Drawings are used for mark-up, record a cross reference at corresponding location on working drawings. Mark with red erasable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work. Mark-up new information which is recognized to be of importance to Owner, but was for some reason not shown on either Contract Drawings or Shop Drawings. Give particular attention to concealed work, which would be difficult to measure and record at a later date. Note related change order numbers where applicable. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on cover of each set.

B. Responsibility for Markup: Where feasible, the individual or entity who obtained record data, whether the individual or entity is the installer, Subcontractor, or similar entity, is required to prepare the mark-up on Record Drawings.

C. At time of Substantial Completion, submit Record Drawings to Owner for Owner's records in accordance with 00 72 13 General Conditions.

1. Refer to Section 01 78 23 for items to be included in manuals.

2. Two (2) copies and one (1) electronic copy will be required.

1.04 RECORD SPECIFICATIONS

A. The Contractor shall maintain one copy of specifications, including addenda, change orders, and similar modifications issued in printed form during construction, and mark-up variations (of substance) in actual work in comparison with text of specifications and modifications as issued. Give particular attention to substitutions, selection of option, and similar information on work where it is concealed or cannot otherwise be readily discerned at a alter date by direct observation. Note related record drawing information and product data, where applicable. Upon completion of mark-up, submit to Architect.

1. The Contractor is responsible for collecting marked-up record Sections from each of the other Subcontractors, and for collating these Sections in proper numeric order with its own Sections to form a complete set of record Specifications. Submit to the Owner.

a. Three (3) copies will be required.

1.05 PRODUCT DATA

A. During the construction period, maintain one copy of each Product Data submittal for Project Record Document purposes.

1. Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site and changes in manufacturer's instructions and recommendations for installation.

2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

3. Note related Change Orders and mark-up of Record Drawings, where applicable.

4. Where record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as record Product Data. Refer to Section 01 78 23 for requirements. Submit to the Owner.

5. The Contractor is responsible for mark-up and submittal of record Product Data.

1.06 SAMPLES

A. Immediately prior to date of Substantial Completion, the Contractor shall meet with the Owner at the site to determine which of the Samples maintained during the construction period shall be transmitted to the Owner for record purposes. Comply with the Owner’s instructions for packaging, identification marking, and delivery to Owner's storage space. Dispose of other Samples in manner specified for disposal of surplus and waste materials.

1.07 MISCELLANEOUS RECORD SUBMITTALS

A. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Owner.

1. Categories of requirements resulting in miscellaneous records include, but are not limited to, the following:

a. Field Records on Excavations and Foundations

b. Field Records on Underground Construction and Similar Work

c. Survey Showing Locations and Elevations of Underground Lines

d. Invert Elevations of Drainage Piping

e. Surveys Establishing Building Lines and Levels

f. Authorized Measurements Utilizing Unit Prices or Allowances

g. Batch Mixing and Bulk Delivery Records

h. Load and Performance Testing

i. Inspections and Certifications by Governing Authorities

j. Leakage and Water-Penetration Tests

k. Fire Resistance and Flame Spread Test Results

l. Final Inspection and Correction Procedures

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 RECORDING

A. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project.

END OF SECTION

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SECTION 01 78 43 - SPARE PARTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Spare Parts and Materials

B. Related Sections:

1. Refer to individual sections for items listed herein, as well as other requirements.

PART 2 PRODUCTS

2.01 EXTRA MATERIALS - GENERAL

A. At the time of building acceptance, deliver to the Owner the following extra materials. Deliver in original unopened cartons or containers (except paint) with each item properly identified.

2.02 JOINT SEALANTS (07 92 00)

A. Furnish extra sealant materials from same production run as the materials applied in the quantities described below. Package materials in unopened, factory-sealed containers with labels describing contents.

1. Quantity: Furnish one unused tube of each type and color of exterior sealant applied.

2.03 DOOR HARDWARE (08 71 00)

A. Guestroom Lock: Two units of CLASSIC X WING LESS ADB by VING.

B. Keypad Lock: One unit.

C. Guest Bath Slider Door Pulls: 2 sets of Pulls.

2.04 TILING (09 30 00)

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to one case for each type, composition, color, pattern, and size indicated.

2.05 ACOUSTIC TILE CEILINGS (09 51 23)

A. Replacement stock amounting to one full box (minimum 12 tiles) of each type.

2.06 RESILIENT FLOORING (09 65 00)

A. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

1. Furnish not less than one box of each class, wearing surface, color, pattern, and size of resilient floor tile installed.

2.07 CARPETING (09 68 00)

A. Furnish extra materials described below before installation begins that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. The Owner shall be permitted to view all carpet scraps and retain any that is chosen for future repairs before they are removed from the job site.

2.08 PAINTING AND SPECIAL COATINGS (09 90 00 / 09 96 00)

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage.

1. Quantity: Furnish the Owner with two gallons of each material and color applied in addition to any leftover amounts.

2. All cans shall be labeled with Finish Index number.

2.09 WALLCOVERING (09 72 00)

A. Package materials with protective covering and identify with labels describing contents.

1. Furnish full-size units equal to two full rolls of each type installed and return all unused material to Owner.

2.10 TOILET AND BATH ACCESSORIES (10 28 00B)

A. Towel Bars: Two units of each type.

B. Toilet Paper Holder: Two units of each type.

C. Rob Hooks: Two units of each type.

D. Shower Caddie: Two units of each type.

2.11 FIRE SUPPRESSION (21 10 00)

A. Operating key handles: Furnish one extra for each key-operated hose bibb and hydrant installed.

B. Sprinkler Cabinets:

1. Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench.

2. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers.

3. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

2.12 PLUMBING FIXTURES (22 40 00)

A. Shower Heads: Two units of each type.

B. Shower Valves and Trims: Two units of each type.

C. Faucet Sets: Five complete sets for Guest Room units.

D. Toilet Seats: Furnish quantity of identical units not less than 2 of each type installed.

E. Guestroom Pedestal Lavs: Two units.

2.13 PLUMBING SPECIALTIES (22 40 00.01)

A. Operating key handles: Furnish one extra for each key-operated hose bibb and hydrant installed.

2.14 DUCT ACCESSORIES (23 33 00)

A. Fusible Links: Furnish quantity equal to 5 of each type installed.

2.15 POWER VENTILATORS (23 34 23)

A. Furnish one set of belts for each belt-driven fan that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

2.16 SELF-CONTAINED AIR-CONDITIONING UNITS (23 81 19)

A. Filters: One set of filters for each unit for PTAC, VTAC, split A/C and Packaged HVAC units.

B. Fan Belts: One set of belts for each unit for Packaged HVAC units.

2.17 PACKAGED TERMINAL AIR CONDITIONING UNITS (23 81 13.13)

A. Replacement stock amounting to providing four complete spare units without sleeves

2.18 INTEGRATED GUESTROOM CONTROL SYSTEM (25 51 10)

A. Furnish 3 door contacts.

B. Furnish 3 spare thermostat for each type/size installed.

C. Furnish 3 spare transmitters that are installed within the PTAC unit.

2.19 ENCLOSED CONTROLLERS (26 29 13)

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents:

1. Spare Fuses and Incandescent Indicating Lamps: Furnish one set of three for each kind.

2.20 INTERIOR LIGHTING (26 51 00)

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:

1. Lamps: Five of each rating installed of the following types (Refer the Light Fixture Schedule located on Electrical Drawing Sheets):

a. Incandescent

b. Fluorescent

c. Compact Fluorescent

d. Metal Halide

2.21 EXTERIOR LIGHTING (26 56 00)

A. Furnish extra materials described below that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: Five of each rating installed of the following types (Refer the Light Fixture Schedule located on Electrical Drawing Sheets):

a. Incandescent.

b. Fluorescent

c. Compact Fluorescent

d. Metal Halide

2.22 FIRE ALARM AND DETECTION SYSTEMS (28 31 00)

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:

1. Lamps for remote indicating lamp units: Two units.

2. Lamps for strobe units: Two units.

3. Smoke detectors, fire detectors, and carbon monoxide detectors: Two units of each type.

4. Detector bases: Two units of each type.

2.23 PAVER UNITS (32 14 13)

A. Furnish stock of pavers that match blend of products installed in the amount of 10 sf.

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section specifies the administrative requirements, procedural obligations, terms and conditions and training requirements related to instructing the facility engineering personnel in the proper care, preservation, operations and maintenance of materials, finishes, equipment and systems.

a. Preparation and submittal of instructor qualifications, training schedules, and agendas for various building materials, components, systems and equipment.

b. Instruction of the Owner's personnel and adjunct organizations in the proper operation and maintenance of all building materials, components, systems and equipment.

B. Related Sections:

1. Special operating and maintenance data requirements for specific equipment or building operating systems are included in the appropriate Specification Sections of Divisions 02 through 33.

2. Preparation of Shop Drawings and Product Data are included in Specification Section 01 33 00, Submittals Procedures.

3. General closeout requirements are included in Specification Section 01 77 00, Contract Closeout.

4. General requirements for submittal of Project Record Documents are included in Section 01 78 39, Project Record Documents.

5. Additional training requirements for building systems and/or equipment are delineated in the appropriate Specification Sections, Divisions 02 through 33.

6. Where training manuals include information on work installed by the Contractor and their Subcontractors, the Contractor shall be responsible for the preparation of the manuals, including collection, collation and binding of the material and submittal of data as specified.

1.02 QUALITY ASSURANCE

A. The status of training deliverables shall be an integral part of the Contractor's coordination process. The Contractor shall meet with the Owner as required, to discuss progress-to-date, deficiencies and non-compliance issues.

1.03 TRAINING MANUALS

A. The completed FINAL VERSION of the approved Operation & Maintenance Manuals and the redlined set of the record "as-built" drawings shall be used as the basis of instruction. The Contractor is not responsible for providing additional copies of these documents for training purposes.

1.04 TRAINING HOURS

A. Training shall be conducted during normal working hours. All training sessions are to be scheduled one week in advanced with the owner. All training shall be completed prior to the public opening of the hotel property.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 TRAINING OF FACILITY ENGINEERING, OPERATING AND MAINTENANCE PERSONNEL

A. Instruct the hotel's personnel in operation, adjustment, and maintenance of all materials, components, equipment and systems.

1. Use the Operation and Maintenance Manuals and the Record "As-Built" Drawings for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of installation, care and preservation, operation, preventive maintenance, service, and replacement.

2. The detailed review of the materials, components, systems and equipment shall include as minimum the following items:

a. Materials, components, systems and equipment

b. Safety precautions and procedures

c. Installation

d. Operational features and functions

e. Operational testing and diagnostics

f. Preventive and predictive maintenance

g. Service: Repair and replacement

h. Operation and Maintenance manual content

i. Commissioning: Testing, adjusting, calibration and balancing

j. Contractor furnished spare parts and extra materials

k. Recommended "spare parts" inventory not furnished by Contractor

l. Specialty tool requirements

m. Lubricants

n. Fuels

o. Identification systems

p. Automatic/manual control systems

q. Hazards/Material Safety Data Sheets

r. Cleaning

s. Procurement of replacement parts

t. Warranty reviews including terms and conditions, points of contact, return material procedures, effective date, extended warranty options

u. Maintenance agreements and similar continuing commitments

v. Record "As-Built" Drawings

3. As part of the operations portion of the training session, demonstrate all operational features and functions.

4. Refer to other specification Sections for additional training requirements associated with engineering, operating and maintenance of various systems/equipment.

B. Provide a combination of classroom, field and factory training classes which includes as a minimum the following curricula requirements as indicated hereafter:

1. SITE WORK UTILITIES: one 2-hour class

a. Water, Storm, and Sanitary Sewer Facilities
b. Drainage Structures
c. Underdrains
d. Electrical Power Service
e. Gas Utilities

2. BUILDINGS AND STRUCTURES: one 4-hour class
   a. Concrete
   b. Unit Masonry
   c. Metals
   d. Woods and Plastics
   e. Thermal and Moisture Protection
   f. Doors and Windows
   g. Finishes
   h. Specialties
   i. Fixtures, Furnishings and Equipment
3. GUESTROOM KEYCARD SYSTEM: one 2-hour class
4. ELEVATORS: one 1-hour class
5. HVAC: one 8-hour class
   a. Basic Materials and Methods
   b. Piping and Specialties
   c. Insulation
   d. Pumping
   e. Refrigeration
   f. Air Handling and Distribution
   g. Pool Dehumidification
   h. Automatic Temperature Controls
   i. Testing/Adjusting/Balancing
6. INNCOM ENERGY MANAGEMENT SYSTEM: one 2-hour class
7. PLUMBING: one 4-hour class
   a. Basic Materials and Methods
   b. Piping and Specialties
   c. Insulation
   d. Pumping
   e. Fixtures, Trim and Accessories
   f. Domestic Water Heaters
   g. Water Softening

8. SWIMMING POOLS AND SPAS: one 2-hour class
    a. Basis Piping and Pumps
    b. Filter and Deck Equipment
    c. Pool Heater
    d. Water Treatment
9. FIRE SPRINKLERS: one 2-hour class
    a. Basic Materials and Methods
    b. Standpipe and Hose Systems
    c. Wet Pipe Sprinkler Systems
10. ELECTRICAL: one 8-hour class
    a. Basic Materials and Methods
    b. Service and Distribution
    c. Service Entrance
    d. Switchboards
    e. Disconnects
    f. Grounding
    g. Transformers
    h. Panelboards
    i. Overcurrent Protective Devices
    j. Contactors
    k. Voltage Surge Suppression
    l. Testing
    m. Lighting
    n. Interior and Exterior Luminaries, Lamps and Accessories
    o. Emergency Lighting
    p. Heat Tracing
11. SOUND SYSTEM: one 1-hour class
12. COMMUNICATION: one 2-hour class
    a. Voice and Data
    b. Television Distribution System
    c. Security Intercom System
13. FIRE ALARM SYSTEM: one 4-hour class
    a. System Zoning and Operations
    b. End-Devices
    c. Carbon Monoxide Monitoring
    d. Supervisory and Control Interface
        Sprinkler Systems
        Elevators

HVAC Fan Control
Telephone

e. Graphic Enunciators

f. Signage

14. FOOD SERVICE & LAUNDRY EQUIPMENT: one 8-hour class

a. The Food Service & Laundry Equipment Contractor shall schedule demonstrations of all Class 2, 3 and 4 equipment by Factory Authorized Demonstrators, at times convenient to the Owner. Demonstration shall include competent instruction in the use, cleaning, repair, and maintenance of the equipment.

1) Class l - Equipment that requires no demonstration. Written instructions will suffice (i.e. roll warmers, toasters, racks, refrigerators, etc.).

2) Class 2 - Equipment that is easy to understand and quickly demonstrated by a Factory Authorized Demonstrator (i.e. ranges, slicers, disposers, etc.).

3) Class 3 - Complex equipment which requires more in-depth knowledge of assembly, operation, maintenance or cleaning. (i.e. steam equipment, multi-tank dish washers, fryer batteries, etc.).

4) Class 4 - High technology equipment or systems that require extensive training, or for which demonstrations are factory-required. (i.e. cook-chill systems, conveyor ovens, etc.).

END OF SECTION

Revision Log

SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED certification based on LEED-NC, 2009.

1. Other LEED prerequisites and credits needed to obtain LEED certification depend on material selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
4. Refer to the LEED 2009 for New Construction and Major Renovation Rating System for specific credit information.

B. Related Sections include the following:

1. Divisions 2 through 48 Sections for Sustainable Design Requirements specific to the Work of each of those Sections.

1.3 OBJECTIVES

A. To obtain acceptable Indoor Air Quality (IAQ) for the completed project and minimize the environmental impacts of the construction and operation, the Contractor during the construction phase of this project shall implement the following procedures singly or in combination:

1. Select products that minimize consumption of non-renewable resources consume reduced amounts of energy and minimize amounts of pollution to produce, and employ recycled and/or recyclable materials. To help purchasers incorporate environmental considerations into purchasing decisions, it is the intent of this project to conform to EPA’s Five Guiding Principles on environmentally preferable purchasing. The five principles are:

a. Include environmental considerations as part of the normal purchasing process.

b. Emphasize pollution prevention early in the purchasing process.

c. Examine multiple environmental attributes throughout a product’s or service’s life cycle.

d. Compare relevant environmental impacts when selecting products and services.

e. Collect and base purchasing decisions on accurate and meaningful information about environmental performance.

2. Control sources for potential IAQ pollutants by controlled selection of materials and processes used in project construction in order to attain superior IAQ.

3. Products and processes that achieve the above objectives to the extent currently possible and practical have been selected and included in these Construction Documents. The Contractor is responsible to maintain and support these objectives in developing means and methods for performing the work of this Contract and in proposing product substitutions and/or changes to specified processes.

1.4 DEFINITIONS

A. Agrifiber Products: Composite panel products derived from agricultural fiber

B. Biobased Product: As defined in the 2002 Farm Bill, a product determined by the Secretary to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials

C. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-FSC-accredited certification body.

D. Composite Wood: A product consisting of wood fiber or other plant particles bonded together by a resin or binder.

E. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair and demolition operations. A construction waste management plan is to be provided by the Contractor as defined in Section 01 74 19.

F. LEED: Leadership in Energy & Environmental Design.

G. LEED NC: The Leadership in Energy & Environmental Design green building rating system developed and adopted by the USGBC for new construction and major renovations of buildings

H. Light Pollution: Light that extends beyond its source such that the additional light is wasted in an unwanted area or in an area where it inhibits view of the night sky

I. Rapidly Renewable Materials: Materials made from plants that are typically harvested within a 10-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.

J. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site. If only a fraction of a product or

material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

K. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

L. Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).

1. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

M. Salvaged or Reused Materials: Materials extracted from existing buildings in order to be reused in other buildings without being manufactured.

N. Sealant: Any material that fills and seals gaps between other materials

O. Volatile Organic Compounds (VOCs): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Compounds that have negligible photochemical reactivity, listed in EPA 40 CFR 51.100(s), are also excluded from this regulatory definition.

1.5 SUBMITTALS

A. General: Submit additional LEED submittals required by other Specification Sections.

B. Sustainable Design Submittals:

1. Alternative Transportation: Provide manufacturer’s cut sheets for all bike racks installed on site, including the total number of bicycle storage slots provided.

2. Heat Island Effect:

a. Site Paving: Provide manufacturer’s cut sheets for all impervious paving materials, highlighting the Solar Reflectance Index (SRI) of the material. Also, provide cut sheets for all pervious paving materials.

b. Roofing Materials: Submittals for roofing materials must include manufacturer's cut sheets or product data highlighting the Solar Reflectance Index (SRI) of the material.

3. Exterior Lighting Fixtures: Submittals must include cut sheets with manufacturer's data on initial fixture lumens above 90° from nadir for all exterior lighting fixtures, and, for parking lot lighting, verification that the fixtures are classified by the IESNA as "full cutoff" (FCO); OR provide documentation that exterior luminaires are IDA-Approved as Dark-Sky Friendly by the International Dark Sky Association (IDA) Fixture Seal of Approval Program.

4. Irrigation Systems: Provide manufacturer's cut sheets for all permanent landscape irrigation system components and for any rainwater harvesting system components, such as cisterns.

5. Water Conserving Fixtures: Submittals must include manufacturer's cut sheets for all water-consuming plumbing fixtures and fittings (toilets, urinals, faucets, showerheads, etc.) highlighting maximum flow rates and/or flush rates. Include cut sheets for any automatic faucet-control devices.

6. Process Water Use: Provide manufacturer's cut sheets for all water-consuming commercial equipment (clothes washers, dishwashers, ice machines, etc.), highlighting water consumption performance. Include manufacturer's cut sheets or product data for any cooling towers, highlighting water consumption estimates, water use reduction measures, and corrosion inhibitors.

7. Elimination of CFCs AND HCFCs: Provide manufacturer's cut sheets for all cooling equipment with manufacturer's product data, highlighting refrigerants; provide manufacturer's cut sheets for all fire-suppression equipment, highlighting fire-suppression agents; provide manufacturer's cut-sheets for all polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation, highlighting the blowing agent(s).

8. Appliances and Equipment: Provide copies of manufacturer's product data for all Energy Star eligible equipment and appliances, including office equipment, computers and printers, electronics, and commercial food service equipment (excluding HVAC and lighting components), verifying compliance with EPA's Energy Star program.

9. On-Site Renewable Energy Systems: Provide cut sheets and manufacturer's product data for all on-site renewable energy generating components and equipment, including documentation of output capacity.

10. Measurement and Verification Systems: Provide cut sheets and manufacturer's product data for all controls systems, highlighting electrical metering and trending capability components.

11. Salvaged or Reused Materials: Provide documentation that lists each salvaged or reused material, the source or vendor of the material, the purchase price, and the replacement cost if greater than the purchase price.

12. Recycled Content: Submittals for all materials with recycled content (excluding MEP systems equipment and components) must include the following documentation:

    a. Cost of each material or product, excluding cost of labor and equipment for installation

b. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the percentage of post-consumer and pre-consumer recycled content (by weight) of each material or product

c. An electronic spreadsheet that tabulates the Project's total materials cost and combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value) expressed as a percentage of total materials cost.

13. Regional Materials: Submittals for all products or materials expected to contribute to the regional calculation (excluding MEP systems equipment and components) must include the following documentation:

a. Cost of each material or product, excluding cost of labor and equipment for installation

b. Location of product manufacturer and distance from point of manufacture to the Project Site

c. Location of point of extraction, harvest, or recovery for each raw material in each product and distance from the point of extraction, harvest, or recovery to the Project Site

d. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of manufacture for each regional material

e. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of extraction, harvest, or recovery for each regional material or product, including, at a minimum, gravel and fill, planting materials, concrete, masonry, and GWB

f. An electronic spreadsheet that tabulates the Project's total materials cost and regional materials value, expressed as a percentage of total materials cost.

14. Biobased Products:

a. Rapidly Renewable Products: Submittals must include written documentation from the manufacturer declaring that rapidly renewable materials are made from plants harvested within a 10-year or shorter cycle and must indicate the percentage (by weight) of these rapidly renewable components contained in the candidate products, along with the costs of each of these materials, excluding labor and delivery costs.

b. Certified Wood: Submittals for all wood-based materials must include a statement indicating the cost of each product containing FSC Certified wood, exclusive of labor and delivery costs, and certificates of chain-of-custody from manufacturers certifying that specified certified-wood products were made from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2 "Principles and Criteria."

15. Outdoor Air Delivery Monitoring: Provide manufacturer's cut sheets highlighting the installed carbon dioxide monitoring system components and sequence of controls shop drawing documentation, including CO_2 differential set-points and alarm capabilities.

16. Interior Adhesives and Sealants: Submittals for all field-applied adhesives and sealants, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content.

    a. Provide manufacturers' documentation verifying all adhesives used to apply laminates, whether shop-applied or field-applied, contain no urea-formaldehyde.

17. Interior Paints and Coatings: Submittals for all field-applied paints and coatings, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content

18. Exterior Paints and Coatings: Submittals for all field-applied paints and coatings, which have a potential impact on ambient air quality, must include manufacturer's MSDSs or other manufacturer's Product Data highlighting VOC content.

19. Floorcoverings:

    a. Carpet Systems: Submittals for all carpet must include the following:

        1) Manufacturer's product data verifying that all carpet systems meet or exceed the testing and product requirements of the Carpet and Rug Institute Green Label Plus program.

    b. Resilient Flooring: Submittals for all resilient floor covering must include manufacturer's product data verifying certification under either the Greenguard for Children & Schools or FloorScore indoor emissions testing program.

    c. Engineered Wood Flooring and Bamboo Flooring: Submittals for all engineered wood flooring and bamboo flooring must include manufacturer's product data verifying certification under either the Greenguard or FloorScore indoor emissions testing program.

20. Composite Wood and Agrifiber Binders: Submittals for all composite wood and agrifiber products (including but not limited to particleboard, wheatboard, strawboard, agriboard products, engineered wood components, solid-core wood doors, OSB, MDF, and plywood products) must include manufacturer's product data verifying that these products contain no urea-formaldehyde resins.

21. Systems Furniture and Seating: Provide manufacturer's product data verifying that all systems furniture and seating products meet the requirements of one of the following:

    a. Greenguard certification

    b. SCS Indoor Advantage certification

    c. SCS Indoor Advantage Gold certification

    d. BIFMA Standard X7.1-2005, as tested to BIFMA method M7.1-2005 and as verified by an independent laboratory

    e. Calculated indoor air concentration limits for furniture systems and seating determined by the U.S. EPA's Environmental Technology Verification Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes (September 1999) testing protocol as conducted in an independent air quality testing laboratory

22. Entryway Systems: Provide manufacturer's cut sheets for all walk-off systems installed to capture particulates, including permanently installed grates, grilles, slotted systems, direct glue-down walk-off mats, and non-permanent roll-out mats.

23. Air Filtration: Provide manufacturer's cut sheets and product data highlighting the following:

    a. Minimum Efficiency Reporting Value (MERV) for filtration media in all air handling units (AHUs)

    b. Minimum Efficiency Reporting Value (MERV) for filtration media installed at return air grilles during construction if permanently installed AHUs are used during construction

24. Mercury in Lighting: Provide manufacturer's cut sheets or product data for all fluorescent or HID lamps highlighting mercury content.

25. Lighting Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting all lighting controls systems components.

26. Thermal Comfort Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting all thermal comfort-control systems components.

27. Blended Cement: It is the intent of this specification to reduce CO_2 emissions and other environmentally detrimental effects resulting from the production of portland cement by requiring that all concrete mixes, in aggregate, utilize blended cement mixes to displace 40% of the portland cement typically included in conventional construction. Provide the following submittals:

    a. Copies of concrete design mixes for all installed concrete

    b. Copies of typical regional baseline concrete design mixes for all compressive strengths used on the Project

    c. Quantities in cubic yards of each installed concrete mix

28. Gypsum Wall Board: Provide manufacturer's cut sheets or product data verifying that all gypsum wallboard products are moisture and mold-resistant.

29. Fiberglass Insulation: Provide manufacturer's cut sheets or product data verifying that fiberglass batt insulation contains no urea-formaldehyde.

30. Duct Acoustical Insulation: Provide manufacturer's cut sheets or product data verifying that mechanical sound insulation materials in air distribution ducts consists of an impervious, non-porous coatings that prevent dust from accumulating in the insulating materials.

31. Green Housekeeping: Provide documentation that all cleaning products and janitorial paper products meet the VOC limits and content requirements of this specification section.

C. Project Materials Cost Data: Provide a spreadsheet in an electronic file indicating the total cost for the Project and the total cost of building materials used for the Project, as follows:

1. Not more than 60 days after the Preconstruction Meeting, the General Contractor shall provide to the Owner and Architect a preliminary schedule of materials costs for all materials used for the Project organized by specification section. Exclude labor costs and all mechanical, electrical, and plumbing (MEP) systems materials and labor costs. Include the following:

    a. Identify each reused or salvaged material, its cost, and its replacement value.

    b. Identify each recycled-content material, its post-consumer and pre-consumer recycled content as a percentage the product's weight, its cost, its combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value), and the total combined recycled content value for all materials as a percentage of total materials costs.

    c. Identify each regional material, its cost, its manufacturing location, the distance of this location from the Project site, the source location for each raw material component of the material, the distance of these extraction locations from the Project site, and the total value of regional materials as a percentage of total materials costs.

    d. Identify each biobased material, its source, its cost, and the total value of biobased materials as a percentage of total materials costs. Also provide the total value of rapidly renewable materials (materials made from plants that are harvested in less than a 10-year cycle) as a percentage of total materials costs.

    e. Identify each wood-based material, its cost, the total wood-based materials cost, each FSC Certified wood material, its cost, and the total value of FSC Certified wood as a percentage of total wood-based materials costs.

D. Construction Waste Management: See Section 01 74 19 "Construction Waste Management" for submittal requirements.

E. Construction Indoor Air Quality (IAQ) Management – Submittals must include the following:

1. Not more than 30 days after the Preconstruction Meeting, prepare and submit for the Architect and Owner's approval, an electronic copy of the draft Construction IAQ Management Plan in an electronic file including, but not limited to, descriptions of the following:

    a. Construction procedures for meeting or exceeding the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995, Chapter 3, including procedures for HVAC Protection, Source Control, Pathway Interruption, Housekeeping, and Scheduling

    b. Construction procedures for protecting absorptive materials stored on-site or installed from moisture damage

    c. Schedule of submission to Architect of photographs of on-site construction IAQ management measures such as protection of ducts and on-site stored oil installed absorptive materials

d. Construction procedures if air handlers must be used during construction, including a description of filtration media to be used at each return air grille

e. Construction procedure for replacing all air-filtration media immediately prior to occupancy after completion of construction, including a description of filtration media to be used at each air handling or air supply unit

2. Not more than 30 days following receipt of the approved draft CIAQMP, submit an electronic copy of the approved CIAQMP in an electronic file, along with the following:

a. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for all filtration media to be installed at return air grilles during construction if permanently installed AHUs are used during construction.

b. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media in all air handling units (AHUs).

3. Not more than 14 days after Substantial Completion provide the following:

a. Documentation verifying required replacement of air filtration media in all air handling units (AHUs) after the completion of construction and prior to occupancy and, if applicable, required installation of filtration during construction.

b. A minimum of 18 Construction photographs: Six photographs taken on three different occasions during construction of the SMACNA approaches employed, along with a brief description of each approach, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.

4. A copy of the report from testing and inspecting agency documenting the results of IAQ testing, demonstrating conformance with IAQ testing procedures and requirements defined in Section 01 81 09 "Testing for Indoor Air Quality."

1.6 QUALITY ASSURANCE

A. General: Perform the work of this Section as a supplement and in accordance with applicable requirements of Division 1 "Contractor Quality Control Program."

B. Preconstruction Meeting: After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner, Architect, and all Subcontractors to discuss the Construction Waste Management Plan, the required Construction Indoor Air Quality (IAQ) Management Plan, and all other Sustainable Design Requirements. The purpose of this meeting is to develop a mutual understanding of the Project's Sustainable Design Requirements and coordination of the Contractor's management of these requirements with the Contracting Officer and the Construction Quality Manager.

C. Construction Job Conferences: The status of compliance with the Sustainable Design Requirements of these specifications will be an agenda item at all regular job meetings conducted during the course of work at the site.

PART 2 - PRODUCTS

2.1 PRODUCT ENVIRONMENTAL REQUIREMENTS.

A. Site Paving: All site impervious paving must be light colored, with a Solar Reflectance Index (SRI) of at least 29.

B. Roofing Materials: All roofing systems, other than vegetated roof systems, must comply with the following requirements:

1. Low-Sloped roofing less than or equal to 2:12 slope must have an SRI of at least 78.

2. Steep-Sloped roofing greater than 2:12 slope must have an SRI of at least 29.

C. Exterior Lighting Fixtures:

1. All exterior luminaires must emit 0% of the total initial designed fixture lumens at an angle above 90° from nadir and/or meet the requirements of the Dark Sky certification program.

2. Exterior lighting cannot exceed 80% of the lighting power densities defined by ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments.

3. No lighting of building facades or landscape features is permitted.

D. Irrigation Systems: Any permanent landscape irrigation systems must be supplied entirely by collected rainwater or graywater and must be comprised of below-grade drip emitters controlled by moisture sensors. Timer controls shall not be permitted.

E. Water-Conserving Fixtures: Plumbing fixtures and fittings shall use in aggregate at least 40% less water than the water use baseline calculated for the building after meeting the Energy Policy Act of 1992 fixture performance requirements. Flow and flush rates shall not exceed the following:

1. Toilets: no more than 1.0 gallons per flush, and have documented bowl evacuation capability per MaP testing of at least 400 grams. Refer to Plumbing Fixture matrix for additional requirements and locations.

2. Urinals: no more than 0.125 gallons per flush or use ‘water-less’ model

3. Lavatory Faucets: 0.5 gpm with automatic faucet controls

4. Kitchen Sink Lavatories: 2.2 gpm

5. Showerheads: no more than 2.0 gpm

F. Process Water Use: Employ strategies that in aggregate result in 20% less water use than the process water use baseline for the building after meeting the commercial equipment and HVAC performance requirements as listed in the Table below. For equipment not addressed by EPACT 2005 or the list below, additional equipment performance requirements may be proposed provided documentation supporting the proposed benchmark or industry standard is submitted.

1. Clothes Washer: 7.5 gallons/cubic foot/cycle

2. Dishwasher with Racks: 1.0 gallons/rack

3. Ice Machine: 20 gallons/100 pounds ice for machines making over 175 pounds of ice per day; 30 gallons/100 pounds ice for machines making less than 175 ice per day. Avoid water-cooled machines.

4. Food Steamer: 2 gallons/hour. Use only boiler-less steamers.

5. Pre-Rinse Spray Valves: 1.4 gallons/minute

6. Kitchen Pot-Washing Sinks: 2.2 gallons/minute

7. Cooling Towers: 2.3 gallons/ton-hr. water loss

    a. Use atrazine-based corrosion inhibitors and reducing bleed-off by increasing cycles of concentration (at least 5, or with water quality problems limit to 4).

    b. Install meters on make-up water and discharge blow-down.

    c. Install conductivity controller for blow-down.

    d. Provide overflow alarm connected to central building controls.

    e. Install drift eliminators.

    f. Provide makeup water from sources other than potable water supply.

G. Elimination of CFCs AND HCFCs:

1. Ozone Protection: Base building cooling equipment shall contain no refrigerants other than the following: HCFC-123, HFC-134a, HFC-245fa, HFC-407c, or HFC 410a.

2. Fire suppression systems may not contain ozone-depleting substances.

3. Extruded polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation shall not be manufactured with hydrochlorofluorocarbon (HCFC) blowing agents.

H. Appliances and Equipment: All Energy Star eligible equipment and appliances, including office equipment, computers and printers, electronics, and commercial food service equipment (excluding HVAC and lighting components), shall be qualified by EPA's Energy Star program.

I. HVAC Distribution Efficiency:

1. All duct systems shall be constructed of galvanized sheet metal, aluminum, or stainless steel as deemed appropriate based on the application requirements. No fiberglass duct board shall be permitted.

2. All medium- and high-pressure ductwork systems shall be pressure-tested in accordance with the current SMACNA standards.

3. All ductwork shall be externally insulated. No interior duct liner shall be permitted.

4. Where possible, all air terminal connections shall be hard-connected with sheet metal ductwork. If flexible ductwork is used, no flexible duct extension shall be more than six feet in length.

5. All HVAC equipment shall be isolated from the ductwork system with flexible duct connectors to minimize the transmittance of vibration.

6. All supply and return air branch ducts shall include the appropriate style of volume damper. Air terminal devices such as grilles, registers, and diffusers shall be balanced at duct branch dampers, not at terminal face.

J. Measurement and Verification: Install controls and monitoring devices as required by division 15 and 16 in order to comply with International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003, Option D.

K. Salvaged or Reused materials: There shall be no substitutions for specified salvaged and reused materials and products.

L. Recycled Content of Materials:

1. Provide building materials with recycled content such that post-consumer recycled content value plus half the pre-consumer recycled content value constitutes a minimum of 10% of the cost of materials used for the Project, exclusive of all MEP equipment, labor, and delivery costs. The Contractor shall make all attempts to maximize the procurement of materials with recycled content.

   a. The post-consumer recycled content value of a material shall be determined by dividing the weight of post-consumer recycled content by the total weight of the material and multiplying by the cost of the material.

   b. The pre-consumer recycled content value of a material shall be determined by dividing the weight of pre-consumer recycled content by the total weight of the material and multiplying by the cost of the material.

   c. Do not include mechanical and electrical components in the calculations.

   d. Do not include labor and delivery costs in the calculations.

   e. Utilize all on-site existing paving materials that are scheduled for demolition as granulated fill, and include the cost of this material had it been purchased in the calculations for recycled content value.

M. Regional Materials: Provide a minimum of 20 percent of building materials (by cost) that are manufactured and extracted/harvested within a 500 mile radius of the project site, exclusive of labor and delivery costs. The Contractor shall make all attempts to maximize the procurement of materials within this specified 500 mile radius.

N. Biobased Products:

1. Solid Wood Products: 50% of all new solid-wood-based materials will be certified as "FSC 100%" by an independent third party in accordance with FSC Forest Stewardship Council "Principles and Criteria" and will have received Chain-of-Custody Certification as certified by an accredited certification group such as Smartwood or Scientific Certification Systems (SCS).

2. Other Wood Products: All other new wood-based materials will be certified by an independent third party in accordance with any of the following standards:

    a. FSC: Forest Stewardship Council "Principles and Criteria" and has received Chain-of-Custody Certification as certified by an accredited certification group such as Smartwood or Scientific Certification Systems (SCS)

3. Wood-based materials include but are not limited to the following materials (when made from wood), engineered wood products, or wood-based panel products:

    a. Rough carpentry

    b. Miscellaneous carpentry

    c. Heavy timber construction

    d. Wood decking

    e. Particleboard

    f. Plywood

    g. Metal-plate-connected wood trusses

    h. Structural glued-laminated timber

    i. Finish carpentry

    j. Architectural woodwork

    k. Wood paneling

    l. Wood veneer wall covering

    m. Wood flooring

    n. Wood lockers

    o. Wood cabinets

    p. Wood doors

O. Outdoor Air Delivery Monitoring:

1. All spaces with an occupant density greater than 1 person per 40 square feet must include at least one CO_2 monitor located between 3 feet and 6 feet above the finished floor.

2. All spaces with occupant density less than 1 person per 40 square feet must include a direct outdoor airflow monitor, capable of measuring the minimum outdoor airflow rate within 15% accuracy.

3. Monitoring equipment must be configured to generate a building automation system alarm and a visual or audible alert when CO_2 concentrations vary by 10% or more from set point.

P. Adhesives and Sealants:

1. All adhesives and sealants used inside the building's thermal envelope must be third-party certified under one of the following programs:

   a. Indoor Advantage Plus from Scientific Certification Systems, Inc.

   b. Greenguard Children and Schools from Greenguard Environmental Institute

   c. Collaborative for High Performance Schools

2. All adhesives and sealants, regardless of where they are used, must comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24):

   a. Concrete Curing Compound: 60 g/L

   b. Concrete Sealer: 10 g/L

   c. Concrete Form Release Agents: 0g/L

   d. Garage Deck Sealer: 50g/L

   e. Wood Glues: 20 g/L

   f. Millwork and Casework Adhesives: 20g/L

   g. Metal to Metal Adhesives: 30 g/L

   h. Adhesives for Porous Materials (Except Wood): 50 g/L

   i. Subfloor Adhesives: 50 g/L

   j. Plastic Foam Adhesives: 50 g/L

   k. Carpet Adhesives: 50 g/L

   l. Carpet Pad Adhesives: 50 g/L

   m. Carpet Seam Sealer: 50g/L

   n. VCT and Sheet Vinyl Adhesives: 50 g/L

   o. Cove Base Adhesives: 50 g/L

   p. Rubber Floor Adhesives: 60 g/L

q. Wood Flooring Adhesives: 100 g/L

r. Ceramic Tile Adhesives: 65 g/L

s. Gypsum Board and Panel Adhesives: 50 g/L

t. Gypsum Drywall Joint Compound: 20 g/L

u. Portland Cement Plaster: 20 g/L

v. Multipurpose Construction Adhesives: 70 g/L

w. Cast Resin Countertop Silicone Sealant: 20g/L

x. Plastic Laminate Adhesives: 20 g/L

y. General Contact Adhesive: 80 g/L

z. Structural Glazing Adhesives and Compounds: 100 g/L

aa. Silicone Sealant: 50 g/L

bb. Pipe Thread Sealant: 50 g/L

cc. Duct Sealant: 10 g/L

dd. Plastic Cement Welding Compounds: 250 g/L

ee. ABS Welding Compounds: 400 g/L

ff. CPVC Welding Compounds: 270 g/L

gg. PVC Welding Compounds: 150 g/L

hh. Adhesive Primer for Plastic: 250 g/L

ii. Architectural Sealants: 250 g/L

jj. Single-Ply Roofing Membrane Adhesives: 250 g/L

3. Interior sealants shall not contain: mercury, butyl rubber, neoprene, SBR (styrene butadiene rubber), or nitrile.

4. Sealants and glazing compounds formulated with aromatic solvents (organic solvent with a benzene ring in its molecular structure) fibrous talc or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, or their components shall not be used.

5. Adhesives used to apply laminates, whether shop-applied or field-applied, shall contain no urea-formaldehyde.

Q. Paints and Coatings:

1. Interior Paints and Coatings: For interior field-applied applications, use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the chemical restrictions (Restricted Components listed below) of Green Seal Standard GS-11, Paints, First Edition, May 20, 1993; Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997; and South Coast Air Quality Management District Rule 1113, Architectural Coatings, rules in effect on January 1, 2004, as follows:

    a. Flat Paints and Coatings: Not more than 10 grams of VOC per liter of coating less water and exempt compounds, including pigments

    b. Non-Flat Paints and Coatings Except High Gloss: Not more than 50 grams of VOC per liter of coating less water and exempt compounds, including pigments.

    c. High Gloss Paints and Coatings: Not more than 150 grams of VOC per liter of coating less water and exempt compounds, including pigments. High Gloss Coatings are coatings that register a gloss of 70 or above on a 60-degree meter according to ASTM Test Method D 523 as specified in paragraph (e)(6).

    d. Water-Based Polychromatic Finish Coatings: Not more than 150 g/L (150 g/L for primer and flat polychromatic paint)

    e. Anti-Corrosive Coatings: Not more than 100 grams of VOC per liter of coating less water and exempt compounds

    f. Sanding Sealers: Not more than 50 grams of VOC per liter of coating less water and exempt compounds

    g. Waterproofing Sealers: Not more than 100 grams of VOC per liter of coating less water and exempt compounds

    h. Concrete Slab Sealers: Not more than 10 grams of VOC per liter of coating less water and exempt compounds

    i. Polyurethanes: Not more than 100 grams of VOC per liter of coating less water and exempt compounds

    j. Stains: Not more than 250 grams of VOC per liter of coating less water and exempt compounds

2. Interior field applied varnishes and lacquers are not permitted.

3. Interior paints shall not contain antimicrobial additives (such as fungicides and biocides).

4. Exterior Paints and Coatings: For exterior applications, use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the chemical restrictions (Restricted Components listed below) of Green Seal's Standard GS-11:

    a. Flat Paints and Coatings: Not more than 50 grams of VOC per liter of coating less water and exempt compounds, including pigments

    b. Non-Flat Paints and Coatings: Not more than 150 grams of VOC per liter of coating less water and exempt compounds, including pigments

c. High Gloss Paints and Coatings: Not more than 150 grams of VOC per liter of coating less water and exempt compounds, including pigments. High Gloss Coatings are coatings that register a gloss of 70 or above on a 60-degree meter according to ASTM Test Method D 523 as specified in paragraph (e)(6)

d. Anti-Corrosive Coatings: Not more than 100 grams of VOC per liter of coating less water and exempt compounds

e. Varnishes and Sanding Sealers: Not more than 275 grams of VOC per liter of coating less water and exempt compounds

f. Stains: Not more than 250 grams of VOC per liter of coating less water and exempt compounds

5. Aromatic Compounds: Paints and coatings shall not contain more than 1% (by weight) total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

6. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein

b. Acrylonitrile

c. Analine dyes

d. Antimony

e. Benzene

f. Butyl benzyl phthalate

g. Cadmium

h. Di (2-ethylhexyl) phthalate

i. Di-n-butyl phthalate

j. Di-n-octyl phthalate

k. 1,2-dichlorobenzene

l. Diethyl phthalate

m. Dimethyl phthalate

n. Ethylbenzene

o. Formaldehyde

p. Hexavalent chromium

q. Isophorone

r. Lead

s. Mercury

t. Methyl ethyl ketone

u. Methyl isobutyl ketone

v. Methylene chloride

w. Naphthalene

x. Toluene (methylbenzene)

y. 1,1,1-trichloroethane

z. Vinyl chloride

aa. Xylene

7. Coordinate with paint manufacturers for implementing a “take-back program” for all unused paint. Set aside scrap and unused paint to be returned to the manufacturer for recycling into new product. Close and seal all partially used containers of paint to maintain quality as necessary for reuse.

R. Floorcoverings:

1. All carpet systems, including adhesives, must meet or exceed the Carpet and Rug Institute Green Label Plus Indoor Air Quality Test Program.

2. Carpet cushion shall not contain brominated flame retardants.

3. Carpet tile applications shall be self-adhering.

4. All resilient floorcovering must be certified under the Greenguard or FloorScore indoor emissions testing programs.

5. Engineered wood flooring and bamboo flooring must be certified under the Greenguard or FloorScore indoor emissions testing programs.

S. Composite Wood and Agrifiber Binders: All composite wood, agrifiber products, and wood doors shall contain no added urea-formaldehyde resins.

T. Systems Furniture and Seating:

1. All systems furniture and seating meet the requirements of one of the following:

a. Greenguard certification

b. SCS Indoor Advantage certification

c. SCS Indoor Advantage Gold certification

d. BIFMA Standard X7.1-2005, as tested to BIFMA method M7.1-2005 and as verified by an independent laboratory

e. Calculated indoor air concentration limits for furniture systems and seating determined by the U.S. EPA's Environmental Technology Verification Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes (September 1999) testing protocol as conducted in an independent air quality testing laboratory

2. Systems furniture and seating made with coatings or sealants that contain any of the following solvents are not permitted: naptha, benzene, toluene, xylene, hexavalent chromium.

U. Entryway Systems: Walk-off systems to capture particulates shall be installed at all entryways directly connected to the outdoors that are used as regular entry points by building users. Acceptable entryway systems include:

1. Permanently installed grates, grilles, or slotted systems that allow for cleaning beneath them

2. Permanently installed direct glue-down walk-off mats

3. Non-permanent roll-out mats, but only if a service organization is contracted for maintenance on a weekly basis

V. Air Filtration: Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better in all air handling units for processing both return and outside air that is delivered to the air supply system. Replace all filtration media after the completion of construction and prior to occupancy.

W. Mercury in Lighting:

1. Provide only low-mercury fluorescent or HID lamps with mercury content limited to the following:

a. T-5 and T-8 fluorescent lamps: 80 picograms per lumen hour

2. Measurement Standards: Lumens to be measured according to IES LM9 for linear fluorescent lamps, IES LM66 for compact fluorescent lamps, and LM51 for HID lamps; mercury content to be measured according to U.S. EPA "Total Mercury by Cold Vapor Absorption Method" 7471A.

X. Lighting Controls: Install and calibrate controls as specified by Division 26 – Electrical in order to comply with LEED IAQ lighting controllability requirements.

Y. Thermal Comfort: Install and calibrate controls as specified in Division 23 – Heating, Ventilation, and Air-Conditioning.

Z. Blended Cement Concrete:

1. Cementitious Materials: Provide composite mix of portland cement and ground granulated blast-furnace slag or fly ash or blended hydraulic cement and limit percentage (by weight) of portland cement (ASTM C150) in aggregate (total weighted average of cementitious material weight for all mixes and pours) to 40% less than standard regional concrete mix designs.

2. Limit percentage (by weight) of standard portland cement (C-150), to the following maximum percentages of the cementitious portion of the mix while maintaining the above-40% required reduction in portland cement across the Project's total quantity of concrete:

   a. Footings: 50%

   b. Slab on Grade: 60%, except for cold-weather pours

   c. Insulated Concrete Form Concrete: 40%

   d. Elevated Slabs: 60%, except for cold-weather pours

   e. Exterior Concrete: 75%

AA. Gypsum Wallboard: Standard paper-faced gypsum wallboard can be used only in dry climates, where wetting during or after construction is not anticipated. In humid climates, where dampness and condensation are a concern, use only non-paper-faced gypsum wallboard. In wet locations a cementitious wallboard, made of portland or magnesium oxide cement, must be used.

BB. Fiberglass Insulation: Fiberglass batt insulation shall contain no formaldehyde-based binders or shall be third-party certified for conformance with Greenguard Children & Schools or Indoor Advantage Gold.

CC. Duct Acoustical Insulation: Mechanical sound insulation materials within the duct shall consist of an impervious, non-porous coating that prevents dust from accumulating in the insulating materials.

DD. Green Housekeeping:

1. Utilize cleaning products that meet the requirements of the Green Seal GS-37 standard or comply with the requirements and maximum VOC limits of Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8.5, Article 2, Regulation for Reducing VOC Emissions from Consumer Products (September 2001).

2. Utilize janitorial paper products and trash bags that meet the minimum percentages of post-consumer recycled content and recovered content requirements of EPA's Comprehensive Procurement Guidelines.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

A. Develop and implement a Construction Waste Management Plan (CWMP), as defined in Section 01 74 19 "Construction Waste Management," quantifying material diversion by weight in order to recycle, reuse, and/or salvage at least 95% (by weight) of construction, demolition, and land-clearing waste.

B. Clean materials which are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

C. Utilize any on-site existing paving materials that are scheduled for demolition as granulated fill or subbase material, and include the weight of this material in the calculations for material diverted from landfill disposal.

D. Arrange for materials collection by or materials delivery to the appropriate recycling or reuse facility.

E. Tax credits and other savings obtained or revenue generated for recycled or reused materials accrue to the Contractor.

F. Discuss CWMP procedures and measures as an agenda item at all regular job meetings conducted during the course of work at the site, and record progress in meeting minutes.

G. Submit monthly progress reports with Applications for Payment in accordance with Section 01 74 19, documenting the status of the CWMP and current diversion percentage rates.

3.2 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

A. Develop and implement a Construction IAQ Management Plan (CIAQMP) to prevent indoor air quality problems resulting from construction activities, including, at minimum, the following:

1. Construction activities must meet or exceed the minimum requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995.

2. During construction, protect all absorptive materials stored on-site or installed from moisture damage as described in the Construction IAQ Management Plan (CIAQMP) defined above. Specifically:

a. Exercise special care at all times in the storage of materials to prevent exposure to moisture.

b. Avoid installation of gypsum wallboard and other porous materials until the building is weather-tight.

c. All standing water which accumulates on interior floors shall be removed on the day that it is observed.

d. Any drywall that has retained more than 20% moisture after 48 hours following exposure to moisture, or that has evidence of mold, must be disposed of in accordance with Specification Section 01 74 19 “Construction Waste Management.”

e. The contractor shall identify and remove all porous building materials that become wet or damaged by moisture within 7 calendar days of such exposure.

3. During construction and HVAC system installation, provide the Architect with photographs of IAQ management measures (such as protection of ducts and on-site or installed absorptive materials), including six photographs on three different occasions depicting implemented SMACNA approaches.

B. Air Filtration:

1. Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better in all air handling units for processing both return and outside air that is delivered to the air supply system; replace all filtration media after the completion of construction and prior to occupancy.

2. Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 8 or better for filtration media installed at return air grilles during construction if permanently installed AHUs are used during construction. Inspect weekly and replace as required.

C. Discuss CIAQMP procedures and measures as an agenda item at all regular job meetings conducted during the course of work at the site, and record progress in meeting minutes.

D. Engage an independent testing and inspecting agency to conduct a baseline indoor air quality testing program after the completion of construction and prior to occupancy in accordance with Section 01 81 09 “Testing for Indoor Air Quality.”

3.3 COMMISSIONING

A. Commissioning: All building energy-related systems and building envelope components shall be commissioned in accordance with the requirements of Specification Section 01 91 00 “Commissioning Requirements” and related commissioning sections in other divisions in order to verify and ensure that fundamental building elements and systems are installed, constructed, calibrated to operate, and perform according to the Owner’s Project Requirements, Basis of Design, and Construction Documents.

3.4 MEASUREMENT & VERIFICATION

A. For new construction, comply with the requirements of the International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003, Option B or D.

B. For existing buildings, comply with the requirements of the International Performance Measurement & Verification Protocol (IPMVP), Volume I: Concepts and Options for Determining Energy and Water Savings, 2001, Option B or D.

END OF SECTION 01 81 13

LEED 2009 for New Construction and Major Renovation

Project Checklist

Project Name Springhill by Marriott - Latrobe PA

Date updated 01.04.10

Y	N	?			
12	**0**	**0**	**Sustainable Sites**	Possible Points:	**26**
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
	X		Credit 2	Development Density and Community Connectivity	5
	X		Credit 3	Brownfield Redevelopment	1
	X		Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
	X		Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
	X		Credit 6.2	Stormwater Design—Quality Control	1
1			Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
1			Credit 8	Light Pollution Reduction	1

4	**0**	**0**	**Water Efficiency**	Possible Points:	**10**
Y			Prereq 1	Water Use Reduction—20% Reduction	
2			Credit 1	Water Efficient Landscaping	2 to 4
			X	Reduce by 50%	2
				No Potable Water Use or Irrigation	4
	X		Credit 2	Innovative Wastewater Technologies	2
2			Credit 3	Water Use Reduction	2 to 4
			X	Reduce by 30%	2
				Reduce by 35%	3
				Reduce by 40%	4

4	0	2	**Energy and Atmosphere**	Possible Points:	**35**

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
1		1	Credit 1	Optimize Energy Performance	1 to 19
				X Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
				? Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
				Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
				Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
				Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
				Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
				Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
				Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
				Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
				Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
				Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
				Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
				Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
				Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
				Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
				Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
				Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
				Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
				Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
	X		Credit 2	On-Site Renewable Energy	1 to 7
				1% Renewable Energy	1
				3% Renewable Energy	2
				5% Renewable Energy	3
				7% Renewable Energy	4
				9% Renewable Energy	5
				11% Renewable Energy	6
				13% Renewable Energy	7
		1	Credit 3	Enhanced Commissioning	2
	X		Credit 4	Enhanced Refrigerant Management	2
3			Credit 5	Measurement and Verification	3
	X		Credit 6	Green Power	2

5	0	4	**Materials and Resources**	Possible Points:	**14**

Y			Prereq 1	Storage and Collection of Recyclables	
	X		Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
				Reuse 55%	1
				Reuse 75%	2
				Reuse 95%	3
	X		Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
1		1	Credit 2	Construction Waste Management	1 to 2
				X 50% Recycled or Salvaged	1
				? 75% Recycled or Salvaged	2
		1	Credit 3	Materials Reuse	1 to 2
				? Reuse 5%	1
				Reuse 10%	2
1		1	Credit 4	Recycled Content	1 to 2
				X 10% of Content	1
				? 20% of Content	2
2			Credit 5	Regional Materials	1 to 2
				10% of Materials	1
				X 20% of Materials	2
		1	Credit 6	Rapidly Renewable Materials	1
1			Credit 7	Certified Wood	1

12	0	2	**Indoor Environmental Quality**	Possible Points:	**15**

Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		1	Credit 1	Outdoor Air Delivery Monitoring	1
	X		Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		1	Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
1			Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			Credit 7.1	Thermal Comfort—Design	1
1			Credit 7.2	Thermal Comfort—Verification	1
1			Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1

3	0	3	**Innovation and Design Process**	Possible Points:	**6**
1			Credit 1.1 Innovation in Design: Specific Title		1
1			Credit 1.2 Innovation in Design: Specific Title		1
		1	Credit 1.3 Innovation in Design: Specific Title		1
		1	Credit 1.4 Innovation in Design: Specific Title		1
		1	Credit 1.5 Innovation in Design: Specific Title		1
1			Credit 2 LEED Accredited Professional		1
0	0	1	**Regional Priority Credits**	Possible Points:	**4**
		1	Credit 1.1 Regional Priority: Specific Credit		1
			Credit 1.2 Regional Priority: Specific Credit		1
			Credit 1.3 Regional Priority: Specific Credit		1
			Credit 1.4 Regional Priority: Specific Credit		1
40	0	12	**Total**	Possible Points:	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Cast-in place concrete, including formwork, reinforcement, concrete materials, accessories mix design, placement procedures, and finishes.

B. Related Sections:

1. Section 33 00 00 - Utility Services
2. Section 32 13 13 - Cement Concrete Paving
3. Section 03 54 13 - Cementitious Decks and Underlayment
4. Section 05 50 00 - Metal Fabrications
5. Section 07 10 00– Damproofing and Waterproofing
6. Section 07 92 00 - Joint Sealants
7. Section 13 11 00.02 - Swimming Pools - Indoor
8. Section 13 11 00.02 – Pool-related Vapor Retarder

1.02 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.03 SUBMITTALS

A. Product Data:

1. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in project.

B. LEED Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

a. Include statement indicating costs for each product having recycled content.

2. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements, and for equivalent concrete mixtures that do not contain portland cement replacements.

C. Design Mixes: For each concrete mix, refer to sheet S-100 for Mixes. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

D. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures. Coordinate built-in items including anchor bolts, plates and clips.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork. Design and engineering of formwork are Contractor's responsibility.

F. Welding Certificates: Copies of certificates for welding procedures and personnel.

G. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

H. Material Certificates: Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in project.

1. Cementitious materials and aggregates.
2. Form materials and form-release agents.
3. Steel reinforcement and reinforcement accessories.
4. Fiber reinforcement.
5. Admixtures.
6. Waterstops.
7. Curing materials.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Epoxy joint filler.
13. Joint-filler strips.
14. Repair materials.

I. Minutes of preinstallation conference.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer with a minimum of five years experience, who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork installations that are similar to those indicated for this Project in material, design, and extent.

C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's (NRMCA) "Certification of Ready Mixed Concrete Production Facilities."

D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 to conduct the testing indicated, as documented according to ASTM E548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

F. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

G. ACI Publications: Comply with the following, unless more stringent provisions are indicated:

1. ACI 301, "Specification for Structural Concrete."
2. ACI 117, "Standard Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete".
4. ACI 212 "Chemical Admixtures for Concrete"
5. ACI 214R "Evaluation of Strength Test Results of Concrete"
6. ACI 301 "Standard Specification for Structural Concrete"
7. ACI 302 "Guide for Concrete Floor and Slab Construction"
8. ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete".
9. ACI 305R "Hot Weather Concreting".
10. ACI 306R "Cold Weather Concreting".
11. ACI 308 "Standard Practice for Curing Concrete"
12. ACI 309R "Guide for Consolidation of Concrete".
13. ACI 311.4R "Guide for Concrete Inspection".
14. ACI 318 "Building Code Requirements for Structural Concrete".
15. ACI 347R "Guide to Formwork for Concrete".
16. ACI SP-66 "ACI Detailing Manual".

H. Other Publications. Comply with the following, unless more stringent provisions are indicated:

1. CRSI-WCRSI "Placing Reinforcing Bars"
2. AWS D1.4 "Structural Welding Code - Reinforcing Steel".

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section - "Administrative and Coordination."

1. Before submitting design mixes, review concrete mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixes.
   c. Ready-mix concrete producer.

d. Concrete subcontractor.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 PRODUCTS

2.01 FORM-FACING MATERIALS

A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615, Grade 60, deformed.

B. Plain-Steel Welded Wire Fabric: ASTM A185, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

B. Tie Wire: Minimum 16 gage annealed type.

2.04 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I.

B. Portland Cement: ASTM C150, Type II.

1. Fly Ash: ASTM C618, Class C or F.

2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.

C. Normal-Weight Aggregate: ASTM C33, uniformly graded, and as follows:

1. Class: Severe weathering region, but not less than 3S.

2. Nominal Maximum Aggregate Size: 3/4 inch.

D. Water: Potable and complying with ASTM C94.

2.05 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C260.

C. Water-Reducing Admixture: ASTM C494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C494, Type F.

E. Water-Reducing and Accelerating Admixture: ASTM C494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C494, Type D.

G. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Avendra, LLC Preferred Manufacturers:

a. None.

2. Approved Manufacturers:

a. “Catexol 1000CL”; Axim Italcementi Group, Inc. (800-899-8795)

b. “MCI 2000 or MCI 2005”; Cortec Corporation (800-426-7832)

c. “DCI or DCI-S”; W. R. Grace & Co., Construction Products Div. (800-778-2880)

d. “Rheocrete 222+”; BASF Admixture Group (216-839-7000)

e. “FerroGard-901”; Sika Construction Products Division, Sika Corporation (800-933-7452)

f. “Eucon CIA”; Euclid Chemical Co, An RPM Company; (800-321-7628)

2.06 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Profile: Ribbed with center bulb.

B. Avendra, LLC Preferred Manufacturers:

1. None

C. Approved Manufacturers:

1. PVC Waterstops:

a. "PVC Waterstop"; Greenstreak, Inc.; (800-325-9504)

b. "Sealtight PVC Waterstops"; W. R. Meadows, Inc.; (800-342-5976)

c. Westec Barrier Technologies; Div. of Western Textile Products, Inc, (800-793-7832)

2.07 VAPOR RETARDERS

A. Refer to Section 07 10 00 for vapor barrier materials.

B. Refer to Section 13 11 00.02 for vapor retarder materials at Pool and high humidity areas.

C. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D448, Size 57, with 100 percent passing a 1-1/2-inch (38-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

2.08 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Material shall become an integral part of concrete surface and leave floor free of residue or film. Products shall be compatible with floor finish adhesives.

2. Avendra, LLC Preferred Manufacturers:

a. None

3. Approved Manufacturers:

a. “Eucobar”; Euclid Chemical Co, An RPM Company; (800-321-7628)

b. “Confilm”; BASF Building Systems (800-433-9517)

c. “SikaFilm”; Sika Construction Products Division, Sika Corporation (800-933-7452)

d. "Cimfilm"; Axim Italcementi Group, Inc. (800-899-8795)

4. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C171, .006 inch (6 mil) thick, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B.

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. “High Seal”; Conspec Marketing & Manufacturing Co., Inc., A Dayton Superior Brand.; (800-348-7351)

b. “Aqua Cure VOX”; Euclid Chemical Co, An RPM Company; (800-321-7628)

c. “Glazecote 20”; Lambert Corp (800-432-4746)

d. “Kure-N-Seal WB”; BASF Building Systems (800-433-9517)

e. “Clearseal WB 150”; Euclid Chemical Co, An RPM Company; (800-321-7628)

f. "Masterkure 200W", BASF Building Systems (800-433-9517)

g. “Kure 200W”; Sonneborn Brand of BASF Building Systems (800-433-9517)

E. Clear, Waterborne, Curing and Sealing Compound: ASTM C1315, 25% solids minimum.

1. Approved Manufacturers:

a. “Conspec #1-30”; Conspec Marketing & Manufacturing Co., Inc., A Dayton Superior Brand.; (800-348-7351)

b. “Super Aqua Cure VOX”; Euclid Chemical Co, An RPM Company; (800-321-7628)

c. “Glazecoat 30”; Lambert Corp (800-432-4746)

d. “Clearseal WB 300”; Euclid Chemical Co, An RPM Company; (800-321-7628)

e. “Kure 1315”; Sonneborn Brand of BASF Building Systems (800-433-9517)

2.09 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber, or ASTM D1752, cork or self-expanding cork.

B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D2240.

C. Polyurea Joint Filler: Two-component, 100 percent solids, with a Shore A hardness of 80 per ASTM D2240.

D. Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

E. Epoxy-Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.

2.10 REPAIR MATERIALS

A. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm).

1. Cement Binder: ASTM C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.

2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than 5700 psi (39 MPa) at 28 days when tested according to ASTM C109/C109M.

2.11 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.

C. Proportion concrete mix for each class of concrete to achieve the strengths (28 days) and slumps noted on the drawings.

D. Cementitious Materials: For concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.

E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

2. Combined Fly Ash and Pozzolan: 25 percent.

3. Ground Granulated Blast-Furnace Slag: 50 percent.

4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

F. Maximum Water-Cementitious Materials Ratio: 0.50 for concrete required to have low water permeability.

G. Maximum Water-Cementitious Materials Ratio: 0.45 for concrete exposed to deicers or subject to freezing and thawing while moist.

H. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:

1. Air Content: 6 percent for 3/4-inch- (19-mm-) nominal maximum aggregate size.

I. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 3 percent.

J. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

K. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94 and ASTM C1116, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94. Mix concrete materials in appropriate drum-type batch machine mixer.

   1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
   2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
   1. Class A, 1/8 inch (3 mm).
   2. Class B, 1/4 inch (6 mm).

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
   1. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Chamfer exterior corners and edges of permanently exposed concrete unless otherwise noted or detailed on drawings.

H. Form openings, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.

B. Embedded items shall be located so as not to reduce the strength of the construction. They shall be thoroughly clean and free from coating, rust, scale, oil and other foreign material. No wood shall be permanently embedded in concrete.

C. Embedments shall be maintained in position and protected until the concreting is complete.

3.03 VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Place, protect, and repair vapor-retarder sheets according to ASTM E1643 and manufacturer's written instructions.

B. Refer to Section 07 10 00 for vapor barrier for additional specifications.

C. Refer to Section 13 11 00.02 for vapor retarder for additional specifications at Pool and high humidity areas.

3.04 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.05 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete

when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch (12 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.06 WATERSTOPS

A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.

3.07 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Owner’s Representative.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

D. Deposit concrete in forms in horizontal layers no deeper than 24 inches (600 mm) and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.08 FINISHING SLABS

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot- (3.05-m-) long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 3/16 inch (4.8 mm).

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Owner's Representative before application.

3.09 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Other than specified in Section 32 13 13 Cement Concrete Pavement, provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

Note: Verify use of curing materials with any possible coatings or finish materials that may be applied to surface with respective manufacturer of new surface materials.

3.10 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.

   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Restrictions on use: Do not use curing compound on surfaces over which homogeneous sheet material will be applied. For surfaces to receive other finishes, submit well in advance of time for curing application, written acceptance of curing compound by both the manufacturer and the installer of the finish material, relative to compatibility therewith of finish material, including primers, adhesives, and similar materials. If manufacturer of finish material has not been determined, Contractor shall be responsible for coordinating such acceptance.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

   1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid epoxy joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Owner's Representative. Remove and replace concrete that cannot be repaired and patched to Owner's Representative approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.

C. Repairing Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

D. Perform structural repairs of concrete, subject to Owner's Representative's approval, using epoxy adhesive and patching mortar.

E. Repair materials and installation not specified above may be used, subject to Owner's Representative's approval.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

2. Slump: ASTM C143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C231, pressure method, for normal-weight concrete; ASTM C173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Unit Weight: ASTM C567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
6. When frequency of testing will provide fewer than five compressive-strength tests Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
    a. Cast and field cure one set of four standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C39; test two laboratory-cured specimens at 7 days and two at 28 days.
    a. Test one field-cured specimens at 7 days and two at 28 days, hold remaining pour in cylinder.
    b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

E. Test results shall be reported in writing to Owner's Representative, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Owner's Representative but will not be used as sole basis for approval or rejection of concrete.

G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Owner's Representative. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Owner's Representative.

END OF SECTION

Revision Log

SECTION 03 54 13 - GYPSUM CEMENT UNDERLAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Gypsum Cement Floor Underlayment.
2. Underlayment Sealer.
3. Topcoat Sealer.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Acoustical Data: Submit Sound tests according to IBC code Criteria ASTM E492 (IIC) and ASTM E90 (STC).

1. Submit in writing that product sound tests have been preformed and tested in accordance with UL fire resistance design number.

C. LEED Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Certificates for Credit MR 5.1: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
    a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
    b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
3. Product Data for Credit EQ 4.1: For Low-emitting adhesives, sealers, primers and underlayment materials, documentation including printed statement of VOC content.

1.03 SYSTEM REQUIREMENTS

A. Performance Requirements:

1. Floor Underlayment:
    a. Minimum Compressive strength of 3,500 psi. Do not over water.
    b. Nominal Average Density: 120 pounds/cubic foot.
2. Sound Control:
    a. Minimum Impact Insulation Class: 50 IIC. ASTM E492
    b. Minimum Sound Transmission Class: 50 STC. ASTM E90.

1.04 QUALITY ASSURANCE

A. Installer's Qualifications: An experienced installer who is acceptable to manufacturer, who has completed cement-based underlayment applications similar in material and extent to that required for this Project, and whose work has resulted in construction with a record of successful in-service performance.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written recommendations for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting underlayment performance.

B. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.

1.07 COORDINATION

A. Coordinate cement-based underlayment with requirements of finish flooring products, including adhesives, specified in Division 09 Sections.

1. Before installing surface sealers recommended by underlayment manufacturer, if any, verify compatibility with finish flooring installation adhesives.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Level- Rock 3500" USG Corporation (800-487-4431)
2. "Gyp-Crete Dura-Cap"; Maxxon Corporation (800-356-7887)
3. "Firm-Fill 4010"; Hacker Industries, Inc. (800-642-3455)

2.02 PRODUCTS AND MATERIALS

A. Gypsum Cement: Gypsum cement product as manufactured by listed manufacturers.

B. Aggregate: Well-graded, washed gravel, 1/8 to ¼", or coarse sand as recommended by underlayment manufacturer.

1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

C. Water: Potable and at a temperature of not more than 70 degrees F.

D. Substrate Primer and Sealer: Levelrock "SE 200" by underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

E. Topcoat Sealer: Levelrock "SE 200" for final sealing of gypsum cement floor underlayment.

1. Supply sealer to Flooring Contractor for application under flooring contract.

2.03 MIXES: Mix proportions and methods shall be in strict accordance with product manufacturer's recommendations and SYSTEM REQUIREMENTS above

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance of underlayment including substrate moisture content. Begin underlayment application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions for substrate indicated. Provide clean, dry, neutral-pH substrate for underlayment application.

1. Subfloor shall be structurally sound, clean, and free of mud, oil, grease, or other contaminants.

B. Prior to installation of Gypsum Cement Underlayment, General Contractor shall inspect the area to be poured for proper attachment of the subfloor and replace any areas of subfloor that have weakened or delaminated during construction. All stud wall base plates in doors and other openings shall be removed.

1. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.

2. Treat nonmoving substrate cracks to prevent cracks from telegraphing through underlayment according to manufacturer's written recommendations.

3. Fill substrate voids to prevent underlayment from leaking.

C. Priming Subfloor:

1. Spray one coat of Floor Primer with a concrete or garden sprayer over entire plywood deck using mix as recommended by underlayment. When applying underlayment over APA span-rated oriented strand or waferboard, apply conditioner and primer as required by underlayment manufacturer.

D. Expansion Joints: Allow joints to continue through the underlayment at same width.

3.03 APPLICATION OF GYPSUM CEMENT UNDERLAYMENT

A. Scheduling: Application shall not begin until the building is enclosed, including roof, windows, doors and other fenestration. Install after drywall installation.

B. Application: Place underlayment at 1-1/2 inch nominal (+0"/-1/4" tolerance) minimum over subfloor. Spread and screed to a smooth surface. Except at authorized joints, place underlayment as continuously as possible until application is complete so that no gypsum cement slurry is placed against underlayment product that has obtained its initial set.

C. Curing: General Contractor shall provide continuous ventilation and adequate heat to rapidly remove moisture from the area until the underlayment is dry. Contractor shall provide mechanical ventilation if necessary. This Contractor shall test for dryness in the presence of the Owner's Representative utilizing the procedure as recommended by the underlayment manufacturer.

3.04 PREPARATION FOR INSTALLATION OF GLUE DOWN FLOOR GOODS

A. Sealing: Seal all areas that receive glue according to the underlayment manufacturer's specifications. Any floor areas where the surface has been damaged shall be cleaned and sealed regardless of floor covering to be used. Where floor goods manufacturers require special adhesive or installation systems, their requirements supersede these recommendations.

3.05 FIELD QUALITY CONTROL

A. Slump Test: Gypsum cement mix shall be tested for slump as it's being pumped using a 2" x 4" cylinder for compliance with manufacturer's written recommendations.

B. Field Samples: At least one set of 3 molded cube samples shall be taken from each day's pour during the application. Cubes shall be tested as recommended by the underlayment manufacturer in accordance with ASTM C472 using split brass molds. Test results shall be available to Owner's Representative and Contractor from applicator upon request.

3.06 PROTECTION

A. During construction, contractor shall place temporary wood planking over underlayment wherever it will be subjected to heavy wheeled or concentrated loads.

END OF SECTION

Revision Log

SECTION 04 20 00 - UNIT MASONRY

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Types of masonry work required include:
    a. Standard Concrete Masonry Units
    b. Mortar and Grout
    c. Reinforcing Steel
    d. Masonry Joint Reinforcement
    e. Required Masonry Ties and Anchors

B. Related Sections:

1. Section 04 71 00 - Simulated Stone
2. Section 07 19 00 - Water Repellents
3. Section 07 20 00 - Thermal Protection
4. Section 07 62 00 - Sheet Metal Flashing and Trim
5. Section 07 92 00 - Joint Sealants

C. Products installed, but not furnished, under this Section include the following:

1. Steel Lintels for unit masonry, furnished under Section 05 50 00 - Metal Fabrications.
2. Hollow-metal frames in unit masonry openings, furnished under Section 08 11 13 Steel Doors and Frames.

1.02 REFERENCES

A. ASTM International Publications:

1. A82 “Standard Specification for Steel Wire, Plain, for Concrete Reinforcement”
2. A185 “Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete”
3. A307 "Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength"
4. A496 “Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement”
5. A497 “Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete”
6. A615 "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement"
7. A951 “Standard Specification for Masonry Joint Reinforcement”
8. C67 "Test Methods of Sampling and Testing Brick and Structural Clay Tile"
9. C90 “Standard Specification for Loadbearing Concrete Masonry Units”
10. C140 "Test Methods of Sampling and Testing Concrete Masonry Units and Related Units"
11. C144 “Standard Specification for Aggregate for Masonry Mortar”

12. C216 “Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)”
13. C270 “Standard Specification for Mortar for Unit Masonry”
14. C404 “Standard Specification for Aggregates for Masonry Grout”
15. C476 “Standard Specification for Grout for Masonry”
16. C641 “Standard Test Methods for Mastics and Coatings Used With Thermal Insulation”
17. C1314 “Standard Test Method for Compressive Strength of Masonry Prisms”
18. D226 “Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing”
19. D2287 “Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds”
20. E119 "Standard Test Methods for Fire Tests of Building Construction and Materials"
21. E514 "Test Method for Water Penetration and Leakage through Masonry"

B. Joint American Concrete Institute (ACI) / American Society of Civil Engineers (ASCE) / The Masonry Society (TMS) Publications:

1. ACI 530-1/ASCE 6/TMS 602 “Specification for Masonry Structures”
2. ACI 530/ASCE 5/TMS 402 “Building Code Requirements for Masonry Structures”

C. National Concrete Masonry Association (NCMA) Publications:

1. "Tek" Bulletins

1.03 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following net-area compressive strengths at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

B. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

C. Fire Resistance Ratings: Where indicated, provide materials and construction which are identical to those of assemblies with fire-resistance ratings determined by testing in compliance with ASTM E119 by a recognized testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.

B. Samples for Initial Selection: For the following:

1. Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
2. Colored mortar Samples showing the full range of colors available.

C. LEED Submittals:

1. Product Certificates for Credit MR 5.2: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

D. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.05 QUALITY ASSURANCE.

A. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602, "Specifications for Masonry Structures", except as otherwise indicated.

1. Revise ACI 530.1/ASCE 6 to exclude Sections 1.5; Parts 1.6-A.1.b and 1.6-A.1.c; an d Part 3.3-E.

B. Fire Resistance Ratings: Where indicated, provide materials and construction which are identical to those of assemblies with fire-resistance ratings determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authority having jurisdiction.

C. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each different product required for each continuous surface or visually related surfaces.

D. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

E. Sample Panels: Before installing unit masonry, build sample panels, using materials indicated for the completed Work, to verify selection and to demonstrate aesthetic effects. Build sample panels for each type of exposed unit masonry assembly in sizes approximately 48 inches long by 48 inches high by full thickness.

1. Locate panels in the locations indicated or, if not indicated, as directed by Owner’s Representative.

2. Clean exposed faces of panels with masonry cleaner indicated.

3. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.

4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by the Owner’s Representative in writing.

a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels, unless such deviations are specifically approved by the Owner’s Representative in writing.

5. Demolish and remove sample panels when directed.

6. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C140.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Store masonry accessories, including metal items, to prevent deterioration by corrosion and accumulation of dirt.

E. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

1.07 PROJECT/SITE CONDITIONS

A. Protection of Work: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform roof loading for at least 12 hours after building masonry walls or columns.

C. Do not apply uniform roof or floor loading until the masonry has cured to the extent that it will safely support the intended load, a minimum of 12 hours after building masonry walls or columns.

D. Do not apply concentrated loads until the masonry has cured to the extent that it will safely support the intended load, a minimum of 3 days after building masonry walls or columns.

E. Staining: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by means of coverings spread on ground and over wall surface.

2. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

1.08 COLD AND HOT WEATHER PROTECTION

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Remove masonry damaged by freezing conditions.

C. Cold Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:

1. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.

2. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry.

3. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F if grouting. Use heat on both sides of walls under construction.

4. 20 deg F and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry.

Heat masonry units to 40 deg F. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F within the enclosures.

D. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:

1. 40 to 25 deg F: Cover masonry with a weather-resistant membrane for 48 hours after construction.

2. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h.

3. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.

E. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

F. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. Comply with hot weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

2. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Oldcastle Architectural Inc. (800-899-8455)

2. Approved Substitution.

C. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

1. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

2. Provide square-edged units for outside corners, unless indicated otherwise on the Drawings.

D. Concrete Masonry Units: Provide units complying with characteristics indicated below for grade, type, face size, exposed face and, under each form of block included, for weight classification:

1. Grade N-1

2. Size:

a. Unless noted otherwise on Exterior Finish Index, provide manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thickness indicated.

3. Exposed Faces:

a. Manufacturer's Standard Gray Color and Texture

b. Face Finish:

1) Smooth

4. Hollow Loadbearing Block: ASTM C90, and as follows:

a. Weight Classification: Medium weight, minimum compressive strength of 2000 psi (net area).

5. Solid Loadbearing Block: ASTM C145, and as follows:

a. Weight Classification: Medium weight, minimum compressive strength of 2000 psi.

2.02 FIRE RATINGS: Where fire ratings on masonry walls are shown on the Drawings, the Contractor shall make certain that the fire-resistant units to be used qualify for the ratings.

2.03 MORTAR AND GROUT MATERIALS

A. Colored Cement Product: Packaged blend made from masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. LeHigh Cement Co. (800-523-5488)

b. Cemex (800-245-1705)

c. Custom Building Products (800-272-8786)

d. LaFarge Corporation (800-336-2490)

e. Essroc, Italcementi Group (800-245-1717)

3. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Use cement with synthetic iron oxide pigment only.

4. Aggregate for Mortar: ASTM C144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

a. White-Mortar Aggregates: Natural white sand or ground white stone.

b. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

B. Aggregate for Grout: ASTM C404.

C. Grout for Unit Masonry: Comply with ASTM C476 for grout for use in construction of reinforced and nonreinforced unit masonry. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Minimum compressive strength shall be 2,500 psi in 28 days.

1. Use fine grout in grout spaces less than 2" in horizontal direction, unless otherwise indicated.

2. Use coarse grout (maximum 3/8" aggregate) in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

D. Water Repellent Admix:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:
   a. "Dry-Block System Mortar Additive"; W. R. Grace & Co., Construction Products Div (800-558-7066)
   b. "Blocktite Mortar Admixture"; Euclid Chemical Co, An RPM Company; (800-321-7628)
3. Mortar additive shall be used in Type M or S Mortar Only.

E. Mortar Color: See Exterior Finish Index.

F. Water: Potable

G. Cold Weather additives shall NOT be used.

2.04 JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES

A. General: Comply with ASTM A 951.

B. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics:
1. Mill Galvanized Steel Wire: ASTM A82 for uncoated wire and with ASTM C641 for zinc coating of class indicated below:
   a. Class 1 (0.40 oz. per sq. ft. of wire surface).
2. Hot-Dip Galvanized, Carbon Steel Wire: ASTM A82 with ASTM A153 for zinc coating of class indicated below:
   a. Class B-2.

C. Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:
1. Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior.
2. Wire Size for Side and Cross Rods: #9 Gauge
3. For single-wythe masonry, provide type as follows with single pair of side rods:
   a. Truss design with continuous diagonal cross rods spaced not more than 16" o.c.
4. For multi-wythe masonry with cavity filled solid with mortar, provide type as follows:
   a. Truss design with diagonal cross rods spaced not more than 16" o.c. and number of side rods as follows:
   b. Number of Side Rods for Multiple-Wythe Concrete Masonry: One side rod for each face shell of concrete masonry back-up and of concrete masonry facing wythe.

D. Anchor Section: Sheet metal plate, with screw holes tope and bottom and with raised, rib-stiffened strap stamped into center to provide slot between strap and plate for connection of wire tie, of overall size and thickness indicated below:
1. Size: Plate and strap size: 1-1/4" wide for plate, 5/8" for strap x lengths indicated below. Slot clearance formed between face of plate and back of strap at maximum rib projection: 1/32" + diameter of wire tie.
2. Plate and Strap Lengths: 5" and 3-5/8", with both sides of plate stiffened by ribs.
3. Thickness: 0.0747" (14 Gauge)

2.05 REINFORCING STEEL

A. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this article.

B. Steel Reinforcing Bars: Material and grade as follows:

1. Billet steel complying with ASTM A615, Grade 60.

C. Deformed Reinforcing Wire: ASTM A496.

D. Plain Welded Wire Fabric: ASTM A185.

E. Deformed Welded Wire Fabric: ASTM A497.

2.06 ACCESSORIES

A. Premolded Control Joint Strips: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall. Size and configuration as indicated.

1. Polyvinyl Chloride Complying with ASTM D2287, General Purpose Grade, Designation PVC-63506.

a. Avendra, LLC Preferred Manufacturers:

1) None

b. Approved Manufacturers:

1) "AA2000-2001 Blocktite"; Hohmann & Barnard, Inc. (800-645-0616)

2) "Rapid Poly-Joint"; Dur-O-Wal, A Dayton Superior Company (800-323-0090)

B. Bond Breaker Strips: Asphalt-Saturated Organic Roofing Felt Complying with ASTM D226, Type I (No. 15 Asphalt Felt)

C. Weepholes: Provide the following for weepholes:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.

a. Products:

1) “Mortar Maze Weep Vent “; Advanced Building Products Inc.

2) “Cell Vents “; Dayton Superior Corporation, Dur-O-Wal Division

3) “No. 85 Cell Vent”; Heckmann Building Products Inc.

4) “Quadro-Vent”; Hohmann & Barnard, Inc.; Quadro-Vent.

5) “Cell Vent “; Wire-Bond;

D. Flashings:

1. Refer to Section 07 62 00 – Sheet Metal Flashing & Trim for flashing materials.

E. Flashing Termination Drip Plates

1. Approved Manufacturers:

a. “Foam-Tite Seal Model No.FTSA”; Hohmann & Barnard, Inc. (800-645-0616)

F. Anchor Bolts: Provide steel bolts wit hex nuts and flat washers complying with ASTM A307, Grade A, hot-dip galvanized to comply with ASTM C153, Class C, in sizes and configuration indicated.

2.07 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard strength general purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated; composed of blended organic and inorganic acids combined with special wetting systems and inhibitors; expressly approved for intended use by manufacturer of masonry units being cleaned without damaging or discoloring masonry surfaces.

B. Avendra, LLC Preferred Manufacturers:

1. None

C. Approved Manufacturers:

1. "Sure Klean No. 600 Detergent"; ProSoCo, Inc. (800-255-4255)

2. "202 New Masonry Detergent"; Diedrich Technologies, Inc. (800-323-3565)

2.08 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification, for types of mortar required, unless otherwise indicated.

1. Use Type mortar as shown on Drawings.

a. Minimum compressive strength as shown on Drawings.

2. For masonry below grade, in contact with earth, and where indicated, use Type - S

3. For reinforced masonry and where indicated, use Type - S.

4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type - S.

5. For mortar parge coats use Type N.

2.09 SOURCE QUALITY CONTROL

A. Contractor will engage a qualified independent testing agency to perform source quality-control testing indicated below:

1. Payment for these services will be made by Contractor using a Testing Agency as approved by the Owner and Architect.

2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

B. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C140.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Verify that foundations are within tolerances specified.

2. Verify that reinforcing dowels are properly placed.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.02 INSTALLATION - GENERAL

A. Do not wet concrete masonry units.

B. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

C. Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

D. Build chases and recesses to accommodate items specified in this Section or in other sections of the Specifications as shown or required. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.

E. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.

F. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.

1. Use dry cutting saws to cut concrete masonry units.

G. Select and arrange units for exposed unit masonry to provide a uniform blend of colors and textures.

3.03 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530-1/ASCE 6/TMS 602 and the following:

1. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20'. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints, do not exceed plus or minus 1/4" in 10'.

2. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls, do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

3. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

4. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

3.04 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

C. Bond Pattern: Lay exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners. Do not use units with less that nominal 4" horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: In each course, rack back 1/2-unit length for 1/2-running bond or 1/3-unit length for 1/3 running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

E. Built-in Work: As construction progresses, build-in items specified under this and other Sections of these Specifications. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

3. Fill cores in hollow concrete masonry units with grout 24” under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.

F. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.

2. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 07 Section "Firestopping."

3.05 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units and brick units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

C. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

D. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

E. All exposed joints shall be well-tooled to a concave or rodded profile, unless otherwise indicated.

1. Provide raked joints at all vertical scores in scored brick units. Strike to match concave or rodded profile of horizontal joints.

2. Rake-out expansion joints and joints indicated on Drawings to receive sealant.

F. Mortar joints shall be struck at a consistent time interval when mortar is at the same medium stiff consistency in order to minimize color variations.

G. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

H. Collar Joints: After each course is laid, fill the vertical longitudinal joint between wythes solidly and with mortar for the following masonry work:

1. All exterior walls, except cavity walls, and interior walls and partitions.

I. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes. Install at not more than 16" o.c. vertically.

J. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.

K. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:

1. Provide individual metal ties at not more than 24" o.c. vertically.

3.06 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls. Lap reinforcing a minimum of 6".

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Reinforce walls with continuous horizontal joint reinforcing, unless specifically noted to be omitted.

D. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

E. Space continuous horizontal reinforcement as follows:

1. For multi-wythe walls (solid or cavity) which are structurally bonded by masonry headers or individual wire ties, space horizontal reinforcement 24" o.c. vertically.

2. For single-wythe walls, space reinforcement at 16" o.c. vertically, unless otherwise indicated.

3. For parapets, space reinforcement at 8" o.c. vertically, unless otherwise indicated.

F. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening, except at control joints.

1. In addition to wall reinforcement, provide additional reinforcement at openings as required to comply with the above.

3.07 CONTROL AND EXPANSION JOINTS

A. General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.

B. Control Joint Spacing: If location of control joints is not shown, place vertical joints spaced not to exceed 30’-0” o.c. for concrete masonry wythes if reinforced, or 20’-0” o.c. if not reinforced. Locate control joints at points of natural weakness in the masonry work.

C. Build-in non-metallic joint fillers where indicated.

3.08 LINTELS

A. Provide masonry lintels as indicated on Structural Drawings.

B. Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

3.09 FLASHING OF MASONRY WORK

A. General: Provide concealed flashing in masonry work at, or above, shelf angles, lintels, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip.

1. Refer to Division 07 Specification Sections for flashing materials.

B. Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4", and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills, turn up ends not less than 2" to form a pan. Extend flashing on exterior to 1/4 inch past wall surface. Do **NOT** cut flush with wall.

C. Install flashing to comply with manufacturer's instructions.

D. Install weep holes in the exterior widths of the head joints of the first course of masonry immediately above embedded flashings. Space 24" o.c. unless otherwise indicated.

3.10 PARGING

A. Parge inside face of firepit wall.

3.11 REPAIRING, POINTING AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Install new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

C. Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel. Leave 1/2 panel uncleaned for comparison purposes. Obtain Owner’s Representative approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.

4. Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

3.12 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

END OF SECTION

Revision Log

SECTION 04 73 00 - MANUFACTURED STONE MASONRY

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Simulated Stone and Cap Stone

a. Exterior Use

B. Related Sections:

1. Section 04 20 00 – Concrete Masonry Units
2. Section 07 19 00 - Water Repellents
3. Section 07 24 19 - Water Drainage Exterior Insulation and Finish System
4. Section 07 62 00 - Sheet Metal Flashing and Trim
5. Section 07 92 00 - Joint Sealants
6. Section 09 21 16 - Gypsum Board Assemblies

C. Products installed, but not furnished, under this Section include the following:

1. Hollow-metal frames in simulated stone masonry openings, furnished under Section 08 11 13, Steel Doors and Frames.

1.02 DEFINITIONS

A. Simulated Stone: Architectural precast stone units intended to simulate natural stone.

1.03 SYSTEM DESCRIPTION

A. General: Fabricate and install simulated stone to withstand loads from wind, gravity, movement of building structure, and thermally induced movement, as well as to resist deterioration under conditions of normal use including exposure to weather, without failure.

B. Provide hand-set (field-installed) anchoring system, including connections to building structure, that is capable of sustaining forces generated by gravity loads, wind loads, and stresses induced by thermal movement, acting separately or in combination, within the following parameters:

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each type of simulated stone, accessory, and other manufactured products, including certifications that each type complies with specified requirements.

B. Samples for verification purposes of simulated stone in form of sets for each color, grade, finish, type, and variety of simulated stone required.

1. Colored pointing mortar and grout samples for each color required showing full range of exposed color and texture to be expected in completed work.

C. Shop Drawings detailing fabrication and installation of simulated stone cladding. Include setting drawings indicating sizes, dimensions, sections, and profiles of stones, arrangement and provisions for jointing, supporting, anchoring, and bonding stonework, and details showing relationship with, attachment to, and reception of related work.

1. Include building elevations showing layout of units and locations of joints and anchors.

D. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing simulated stone similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to manufacture required units.

B. Single-Source Responsibility for Simulated stone: Obtain each color, grade, finish, type, and variety of stone from a single manufacturer with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to mold and finish material without delaying the progress of the work.

C. Single-Source Responsibility for Mortar and Grout Materials: Obtain mortar ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

D. Single-Source Responsibility for Other Materials: Obtain each type of simulated stone accessory, sealant, and other materials from one manufacturer for each product.

E. Installer Qualifications; Engage an experienced installer who has completed stone cladding similar in material, design, and extent to that indicated for project that has resulted in construction with a record of 5 years of successful in-service performance.

F. Sample Panels: Before installing simulated stone, build sample panels, including all materials flashings, sheathing and sealants. Panel to represent complete construction. Materials shall be same as for the completed work. Panels to verify selection and product aesthetic effects. Build sample panels for each type of exposed simulated stone assembly in sizes approximately 48 inches long by 48 inches high by full thickness.

1. Locate panels in the locations indicated or, if not indicated, as directed by Owner's Representative.

2. Build mock-ups for the following types of dimension stonework:

   a. Typical exterior simulated stone of each type, full size in conjunction with mock-up for EIFS or face brick. Illustrate field pattern of stone and color and tooling of joints.

   b. Mockups may be incorporated into the work. If not, retain mock-ups during construction as standard for judging completed dimensions stonework. When directed, demolish mock-ups and remove from site.

3. Clean exposed faces of panels with masonry cleaner indicated.

4. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.

5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by the Owner's Representative in writing.

   a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels, unless such deviations are specifically approved by the Owner's Representative in writing.

6. Demolish and remove sample panels when directed.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver simulated stone materials to project in undamaged condition in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store simulated stone on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

1. Do not use pinch or wrecking bars.

2. Lift with wide-belt-type slings where possible. Do not use wire rope or ropes containing tar or other substances that might cause staining. If required to move stone, use wood rollers with cushions at end of wood slides.

3. Store simulated stone on wood skids or pallets covered with nonstaining, waterproof membrane. Place and stack skids and stones to distribute weight evenly and to prevent breakage or cracking of stones.

4. Protect cast stored stone from weather with waterproof, nonstaining covers or enclosures, but allow air to circulate around stones.

5. Store cementitious materials off the ground, under cover, and in dry location.

6. Do not use salt or calcium-chloride to remove ice from simulated stone surfaces.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Store simulated stone accessories, including metal items, to prevent deterioration by corrosion and accumulation of dirt.

1.07 PROJECT/SITE CONDITIONS

A. Protection of Work: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed simulated stone when construction is not in progress.

B. Staining: Prevent grout, mortar, and soil from staining the face of simulated stone to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such simulated stone.

a. Protect base of walls from rain-splashed mud and from mortar splatter by means of coverings spread on ground and over wall surface.

C. Environmental Requirements:

1. Ambient air temperature shall be in accordance with manufacturer's requirements.

2. Maintain materials and surrounding air temperature to minimum 40 degrees prior to, during, and for 48 hours after completion of work.

3. Protect materials from rain, moisture, and freezing temperatures prior to, during, and after 48 hours after completion of work.

4. Allow no construction activity on opposite side of wall during installation, and for 48 hours after completion of work.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Comply with referenced standards and other requirements indicated applicable to each type of material required.

2.02 MANUFACTURERS

A. Avendra, LLC Preferred Manufactures:

1. None

B. Approved Manufacturers:

1. "Cultured Stone"; Cultured Stone, Division of Owens Corning (800-2551727)
2. "Eldorado Stone "; Eldorado Stone, A Headwaters Company (800-925-1491)
3. Arriscraft International, Inc. (800-265-8123)
4. Pro Cast Stone (262-677-9810)
5. Approved Substitutions
    a. Sizes and Shapes: As indicated in Exterior Finish Index.
    b. Color & Texture: As indicated in Exterior Finish Index.

2.03 ACCESSORIES

A. Air/Moisture Barrier: A ready mixed acrylic based, fiber reinforced, waterproof coating. Provided products specified under Section 07 24 19. Provide single manufacturer for Air/Moisture Barrier for both Section 07 24 19 and this Section.

B. Drainage Mat: "EnkaRain 9714" manufactured by Colbond, Sand Hill Road, Enka, N.C. 28728 Tele (800)365-7391.

1. Physical Properties:

a.	Thickness:	0.18 inches.
b.	Total Weight:	3.54 oz/yd^2
c.	Weight:	12.34 oz/yd$^{2.}$
d.	Core Polymer:	Nylon 6.
e.	Recycled content:	40%.
f.	Flame Spread:	5; Class A.

C. Weather Resistant Barrier: Kraft waterproof building paper, UBC Standard 14-1.

D. Metal Lath: 18 gauge galvanized woven wire mesh, or galvanized 2.5 lb. Flat diamond mesh.

E. Flexible Flashing: As specified in Section 07 62 00.

F. Fasteners: Min 7/16" (11.1mm) head diameter, corrosion-resistant self-drilling, self-tapping, pancake head screws of sufficient length to penetrate 3/8" (10mm) into the stud.

2.04 MORTAR AND GROUT MATERIALS

A. Refer to manufacturers Standard Installation (Grouted Joints) instructions.

B. Portland Cement: ASTM C150, Type I, of natural color or white, as needed to produce color indicated.

C. Hydrated Lime: ASTM C207, Type S

D. Aggregate: ASTM C144, and as indicated below:

1. For joints narrower than 1/4 inch, use aggregate graded with 100 percent passing the No. 8 sieve and 95 percent the No. 16 sieve.
2. For pointing mortar, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White Mortar Aggregates: Natural white sand or ground white stone.

2.05 SIMULATED STONE FABRICATION

A. General: Fabricate simulated stone in sizes and shapes required to comply with requirements indicated, including details on Drawings and final Shop Drawings.

B. Carefully inspect finished stones at fabrication plant for compliance with requirements relative to qualities of appearance, material, and fabrication. Replace defective stones with ones that do comply.

2.06 MORTAR AND GROUT MIXES

A. General: Comply with referenced standards and with manufacturers' instructions relative to mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality and with optimum performance characteristics.

1. Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or calcium chloride, unless otherwise indicated.

2. Mixing: Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortars and grout when they have reached their initial set.

B. Portland Cement/Lime Setting Mortar for Nonpaving Installations: Comply with ASTM C 270, Proportion Specification, for types of mortars and stone indicated below:

1. Set stone with Type N mortar. Color as selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive simulated stone work, and conditions under which materials will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of dimension stonework. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of simulated stone work.

3.02 PREPARATION

A. Advise installers of other work about specific requirements relating to placement of inserts, flashing reglets, metal anchors, and similar items to be used by stonework installer for anchoring, supporting, and flashing of dimension stonework. Furnish installers of other work with Drawings or templates showing locations of these items.

B. Verify items provided by other sections of work are properly sized and located.

C. Sheathed Surfaces: Over air and moisture barrier, install single drainage mat, followed with layers of weather-resistant barrier. Lap joints with a 4-inches shingle fashion. Apply code approved metal lath, attach using galvanized nails a minimum of 6-inches on center vertically and 16 inches on center horizontally, which penetrate a minimum of 1-inch into the wood stud framing. Wrap weather resistant barrier and metal lath a minimum of 16 inches around all outside and inside corners.

D. Concrete and Masonry Surfaces, New, Clean and Untreated: Examine newly poured concrete closely to ensure that the finished surface contains no releasing agents (form oil). If it does contain form oil, etch surface with muriatic acid, rinse thoroughly and score with a wire brush, or use high-pressure water, or sandblasting to remove. Apply air and moisture barrier, and a single layer of drainage mat, followed by multiple layers of weather-resistant barrier per Masonry Veneer Manufacturers Association (MVMA) guidelines. Install code approved metal lath to wall surfaces using galvanized concrete nails. Nails shall be a minimum of 6-inches on center vertically and 16 inches on center horizontally.

3.03 ERECTION

A. Comply with manufacturer's product data, including product technical bulletins and published installation instructions.

B. General: Install/set all units and accessories accurately, using skilled, experienced personnel, according to approved shop and setting drawings.

1. Use stone-fitters to perform field-cutting with power saws, when required.

a. Cut masonry units with wet-saw.

C. Clean stone surfaces before setting, using only water or mild cleaning compounds containing no caustic or abrasives. Clean cut units using a stiff fiber brush and clean water. Allow units to surface dry prior to placement.

D. Provide chases, reveals, openings, and other spaces required to accommodate other work. Close up after other work is complete with simulated stone which matches stone already set.

E. Mortar: Apply 3/4 inch of mortar to lath, covering a maximum of 10 square feet at one time. Press the units firmly into position in soft mortar bed, wiggle and apply slight pressure to unit to ensure firm bonding causing mortar to extrude slightly around edges of units.

1. For stones applied in hot or dry weather, the back of each piece shall be moistened with a fine spray of water or a wet brush to adequately prevent excessive absorption of moisture from the mortar. If being installed over concrete, masonry or scratch coat substrate, the substrate surface area should also be dampened before applying mortar.

2. Applications should be protected from freezing, as mortar will not set up properly under such conditions. Do NOT use antifreeze compounds to lower the freezing point of mortar.

F. Masonry Flashing: Extend flashing through veneer, turn up and bed into mortar joint of masonry, seal to concrete or seal into sheathing over stud framed back-up.

a. Lap end joints and seal watertight.

G. Joints:

1. Mortar joints should not be over 1/2-inch to 3/4-inch in width. Set simulated stone accurately, in patterns and locations indicated, with uniform joints of dimensions indicated, and with edges and faces aligned according to established relationships and indicated tolerances.

2. Remove excess mortar; do not allow mortar to set up on face of units. Point and rake joints before mortar have set.

H. Movement Control Joints

1. Construct movement joints in locations noted on Drawings.

2. Do not continue horizontal joint reinforcing across movement control joints.

3. Form movement control joints by leaving head joints between stacked units void of mortar, ready for application of bond breaker and joint sealant.

4. Size joint in accordance with Section 07 92 00 for sealant performance.

I. Setting Units: Press each stone into the mortar setting bed firmly enough to squeeze some mortar out around the stone's edges. Apply pressure to the stone to ensure a good bond. Ensure complete coverage between the mortar bed and the surface of the stone. Mortar may also be applied to the entire back of the stone.

J. Shim and adjust anchors, supports, and accessories.

K. Mortar Color: As indicated in Exterior Finish Index.

3.04 PROTECTION

A. Protect work during erection as follows:

1. Cover top of walls with nonstaining waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches down both sides and hold securely in place.
2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials from stone without damage to latter.
3. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
4. Protect sills, ledges, and projections from droppings of mortar and sealants.

B. Provide final protection and maintain conditions in a manner acceptable to fabricator and installer ensuring dimension stonework being without damage or deterioration at time of Substantial Completion.

3.05 ADJUSTING AND CLEANING

A. General: Perform final cleaning as soon as possible after mortar has set and been tooled. Clean faces of stone at pointed joints immediately. Remove soiled areas, streaks and stains from prefinished panels using clean water and soft bristle brush, followed by clear water rinse.

B. Use no wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods which could damage, discoloration, etching of surfaces or joints, without written approval from simulated stone manufacturer.

C. Clean stone surfaces that have become dirty or stained prior to setting to remove soil, stains, and foreign materials. Clean stones by thoroughly scrubbing stones with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh filler or abrasives.

D. Remove and replace or repair simulated stone work of the following description:

1. Broken, chipped, stained, or otherwise damaged stones. Broken, chipped, stained, or otherwise damaged stone may be repaired, providing the methods and results are acceptable to Architect.
2. Defective joints.
3. Stones and joints not matching approved samples and field-constructed mock-up.
4. Simulated stone work not complying with other requirements indicated.

E. Acceptable Appearance: Simulated stone shall show no obvious repairs or imperfections, other than minimal color variations, when viewed with the unaided eye at a 20 foot distance in normal daylight conditions.

F. Replace in manner that results in dimension stonework matching approved samples and field-constructed mock-ups, complying with other requirements, and showing no evidence of replacement.

G. Remove protection materials upon substantial performance of the work or when risk of damage is no longer present.

END OF SECTION

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Structural Steel

B. Related Sections:

1. Section 05 50 00 - Metal Fabrications: For loose steel bearing plates and miscellaneous steel framing.
2. Section 09 90 00 - Painting: For surface preparation and priming requirements.
3. Section 09 96 00 - High Performance Coatings: Steel items within Interior Pool Rooms.

1.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.

B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

1.03 SUBMITTALS

A. Product Data: For each type of product specified.

1. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in project with the following supporting data:
   a. Shop Drawings detailing fabrication of structural steel components.
      1) Include details of cuts, connections, splices, camber, holes, and other pertinent data.
      2) Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
      3) Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
      4) Include Shop Drawings signed and sealed by a qualified professional engineer responsible for their preparation.
   b. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
   c. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.
      1) Structural steel, including chemical and physical properties
      2) Bolts, nuts, and washers, including mechanical properties and chemical analysis
      3) Direct-tension indicators

4) Shop primers

5) Nonshrink grout

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer with a minimum of five years experience, who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

1. Fabricator must participate in the AISC Quality Certification Program and be designated an AISC-Certified Plant as follows:

a. Category: Category "Sbd", Conventional Steel Building Structures.

C. Comply with applicable provisions of the following specifications and documents:

1. American Institute of Steel Construction Inc. (AISC) Publications:

a. "AISC Code of Standard Practice for Steel Buildings and Bridges."

b. "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design."

2. ASTM International Publications:

a. A6 "Standard Specification for General Requirements for Rolled Steel Bars, Plates, Shapes, and Sheet Piling."

b. A27 "Standard Specification for Steel Castings, Carbon, for General Application"

c. A36 "Standard Specification for Carbon Structural Steel".

d. A53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless"

e. A108 "Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished"

f. A123 "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products"

g. A153 "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"

h. A325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength"

i. A490 "Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength"

j. A500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes"

k. A572 "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel"

l. A780 "Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings"

m. C1107 "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)"

n. E119 "Standard Test Methods for Fire Tests of Building Construction and Materials"

o. E164 "Standard Practice for Ultrasonic Contact Examination of Weldments"

p. E709 "Standard Guide for Magnetic Particle Examination

3. Research Council on Structural Connections (RCSC) Publications:

a. "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

E. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."

1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Section 01 31 00 "Project Management and Coordination."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.06 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural Steel Shapes, Plates, and Bars: As follows:

1. Carbon Steel: ASTM A36.

2. High-Strength, Low-Alloy Columbium-Vanadium Steel: ASTM A572 or ASTM A992, Grade 50.

B. Cold-Formed Structural Steel Tubing: ASTM A500, Grade B.

C. Steel Pipe: ASTM A53, Type E or S, Grade B.

D. Anchor Rods, Bolts, Nuts, and Washers: As follows:

1. Unheaded Rods: ASTM A36.

2. Headed Bolts: ASTM A325, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.

3. Headed Bolts: ASTM A490, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.

4. Washers: ASTM A36.

E. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers. Finish shall match material connected unless noted otherwise on plans.

1. Finish: Plain, uncoated.

F. High-Strength Bolts, Nuts, and Washers: ASTM A490, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated.

G. Welding Electrodes: Comply with AWS requirements.

2.02 PRIMER

A. Fabricator's standard, fast-curing, lead-free, universal primer; selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure, complying with performance requirements of FS TT-P-664.

B. Where prime painted steel is to receive sprayed-on fireproofing, the substrate shall provide adequate adhesion. Coordinate with fireproofing installer in selecting primer paint to be used to assure this requirement is met.

C. Primer paint shall be compatible with finish coats on architecturally exposed steel.

1. SSPC Paint 25 BCS, Type II, iron oxide, zinc oxide, raw linseed oil and Alkyd or one coat of SSPC Paint 23, latex primer, as verified with top coat manufacturer.

2.03 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, of consistency suitable for application, and a 30-minute working time.

2.04 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Camber structural steel members where indicated.

2. Mark and match-mark materials for field assembly.

3. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.

4. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.

5. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.

C. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

D. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.

1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.05 SHOP CONNECTIONS

A. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

1. Bolts: ASTM A325 high-strength bolts, unless otherwise indicated.

2. Connection Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.

2.06 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Do not prime.

2. Surfaces to be field welded.

3. Surfaces to receive sprayed-on fireproofing.

4. Exterior Railings and surfaces within interior pool area to receive “high performance coatings” require special primers. See Section 09 06 00.

5. Galvanized surfaces.

B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:

1. All interior steel exposed to view SP6 commercial blast cleaned.

2. All exterior steel exposed to weather SP10 near white blast cleaned.

3. All other steel SP3 power tool cleaned.

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 2.0 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

D. Paint Systems: Review painting specifications for finish paint systems. Coordinate surface preparations of steel and type of primer used with specifications and the manufacturer’s recommendations to insure compatibility.

2.07 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A123.

2.08 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.

2. Provide testing agency with access to places where structural steel Work is being fabricated or produced so required inspection and testing can be accomplished.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

D. Joints Using ASTM A325 or A490 Bolts."

E. Shop-bolted connections will be tested and inspected according to RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A325 or A490 Bolts."

F. In addition to visual inspection of all welds, shop-welded full penetration welds will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.

1. Liquid Penetrant Inspection: ASTM E165.

2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.03 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.

2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

a. Comply with manufacturer's instructions for proprietary grout materials.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

1. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Engineer of Record.

G. Finish sections thermally cut during erection equal to a sheared appearance.

H. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

3.04 FIELD CONNECTIONS

A. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

1. Bolts: ASTM A325 high-strength bolts, unless otherwise indicated.

2. Connection Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.

3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

3.05 FIELD QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

D. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

E. In addition to visual inspection of all welds, field-welded full penetration welds will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.

1. Liquid Penetrant Inspection: ASTM E165.

2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

3.06 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on structural steel are included in Section 09 90 00 "Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A780.

END OF SECTION

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SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Rough Hardware
2. Loose Bearing and Leveling Plates
3. Metal Stairs
4. Ladders:
   a. Elevator Pit Ladder
   b. Alternating Tread Ladder/Stair to Roof
5. Support Angles for Elevator Door Sills
6. Elevator Sump Pit Cover
7. Elevator Hoistway Beams
8. Pipe Bollards
9. Laundry Trench Grate
10. Safe or Depository Box
11. Steel framing and supports for countertops
12. Miscellaneous Metal Trim
13. Metal Wall Base
14. Steel Framing and Supports for Applications where framing and supports are not specified in other Sections

B. Related Sections:

1. Section 09 30 00 - Tiling
2. Section 09 65 00 – Resilient Flooring
3. Section 09 68 00 - Carpeting
4. Section 09 90 00 - Painting
5. Section 09 96 00 - High Performance Coatings
6. Section 11 25 13 – Registration Equipment
7. Section 14 21 23 – Electric Traction Passenger Elevators
8. Section 32 31 13 - Fences and Gates

1.02 SYSTEM DESCRIPTION

A. System Performance Requirements:

1. All stairways, platforms, treads, and landings of Steel Stairs: Capable of supporting a live load of 100 lbf per sf and a concentrated load of 300 lbf.
2. Railings: As required by applicable codes but not less than the following:

3. Handrails: Size must not exceed recommendations of ADA and ANSI A117.1
    a. 200 lbs. concentrated load applied at any point in any direction.
    b. 50lb/ft. uniform load applied horizontally at required railing height and a simultaneous uniform load of 100 lb/ft applied vertically downwards at the top of the guardrail.
4. Guardrail Infill: 200 lb horizontal load applied in any location over one square foot area.
5. The following loads are not required to be applied simultaneously:
    a. “Concentrated” and “uniform” loads for the top railing.
    b. Loads for the top railing and in-fill areas.
    c. Openings: Guards must not allow passage of a sphere 4 inches in diameter.
    d. Posts and Anchorage: As required to safely accommodate all transmitted rail loads specified above.
6. Ladders: Comply with ANSI A14.3.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

B. Submit “Letter of Conformance” in accordance with Section 01 33 00.
    1. Include supporting product data for products used in miscellaneous metal fabrications, including paint products and grout.

C. Submit Shop Drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

D. Submit samples representative of materials and finished products as may be requested by Owner’s Representative.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

B. Installer Qualifications: Arrange for installation of metal fabrications specified in this Section by same firm that fabricated them.

C. Quality welding processes and welding operators in accordance with the following:
    1. AWS D1.1 "Structural Welding Code - Steel"
    2. AWS D1.3 "Structural Welding Code - Sheet Steel"
    3. AWS D1.2 "Structural Welding Code - Aluminum"

D. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.05 PROJECT/SITE CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.06 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A36

C. Steel Pipe: ASTM A53

1. Black finish, unless otherwise indicated.

2. Galvanized finish for exterior installations, unless shown to receive special coatings.

3. Type E, OR S, Grade B, Fy = 35 KSI, unless otherwise indicated, or another weight, type, and grade required by structural loads.

D. Gray Iron Castings: ASTM A48, Class 30

E. Malleable Iron Castings: ASTM A47, Grade 32510

F. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

G. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A153.

H. Welding Rods: Select in accordance with AWS Specifications for the metal alloy to be welded.

2.02 FASTENERS

A. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required for each application and complying with applicable standards.

1. Bolts and Nuts: Regular hexagon head bolts, ASTM A307, Grade A with hex nuts ASTM A563; and, where indicated, flat washers.

2. Anchor Bolts: ASTM F1554, Grade30

3. Lag Bolts: Square head type, ASME B18.2.1

4. Machine Screws: Cadmium plated steel, ASME B18.6.3

5. Wood Screws: Flat head carbon steel, ASME B18.6.1

6. Plain Washers: Round, carbon steel, ASME B18.22.1

7. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1

8. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in

concrete, as determined by testing per ASTM E488, conducted by a qualified independent testing agency.

a. Interior Use - Material: Carbon-steel components zinc-plated to comply with ASTM B633, Class Fe/Zn 5.

b. Exterior and Swimming Pool Use - Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F593 and nuts complying with ASTM F594.

9. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.03 GROUT AND ANCHORING CEMENT

A. Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior heavy-duty loading applications of type specified in this Section.

B. Avendra, LLC Preferred Manufacturers:

1. None

C. Approved Manufacturers:

1. "Euco N-S Grout", Euclid Chemical Co, An RPM Company (800-321-7628)

2. " Masterflow 713 Plus ", Degussa Building Systems, Inc (800-243-6739)

3. " Sonogrout 10K ", Degussa Building Systems, Inc (800-243-6739)

D. Interior Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

E. Erosion-Resistant Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

2.04 CONCRETE FILL AND REINFORCING MATERIALS

A. Concrete Materials and Properties: Comply with requirements of Section 03 30 00, and as shown on Drawings, with minimum 28-day compressive strength of 3,000 PSI, unless otherwise indicated.

B. Non-slip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rustproof and non-glazing; unaffected by freezing, moisture, or cleaning materials.

C. Reinforcing Bars: ASTM A615, Grade 60, unless noted otherwise.

2.05 PAINT

A. Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-curing, lead and chromate-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-664.

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. Carbozinc 621"; Carboline Co. (800-848-4645)

b. "Epoxy Zinc-Rich Primer CM18/CM19"; Benjamin Moore & Co. (888-236-6667)

c. Tneme-Zinc 90-97; Tnemec Co. (800-863-6321)

B. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

2.06 FABRICATION - GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Allow for thermal movement resulting from the following maximum change (range) of exterior metalwork in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss. Temperature Change (Range): 120 Degrees F., ambient; 130 degrees F., material surfaces.

C. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts. Locate joints where least conspicuous.

D. Weld corners and seams continuously to comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour

E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

F. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.07 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.08 STEEL FRAMED STAIRS

A. General: Construct stairs to conform to sizes and arrangements indicated. Join pieces together by welding, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, railings newels, balusters, struts, clips, brackets, bearing plates, and other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure.

B. At Contractor's option, provide custom fabricated stairs or prefabricated stair assemblies with metal pan-type treads, attached to installed stringers using manufacturer's standard connection detail.

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. The Sharon Companies, Ltd. (800-792-0129)

b. American Stair Corporation, Inc. (800-872-7824)

c. Approved substitution

3. Required Tread Styles:

a. Concrete Fill Pan-Type Treads

4. Tread Finish:

a. At locations shown not to be covered with finish materials provide a non-slip aggregate finish with factory-packaged abrasive aggregate made from fused aluminum-oxide grits or crushed emery, rust-proof and non-glazing.

C. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM "Metal Stair Manual"

D. Fabrication, General

1. Form steel stairs from materials of size, thickness, and shapes indicated, but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on Shop Drawings, using proven details of fabrication and support.

2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

3. Shear and punch metals cleanly and accurately.

4. Remove sharp or rough areas on exposed surfaces.

5. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

6. Weld corners and seams continuously to comply with the following:

a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

b. Obtain fusion without undercut or overlap.

c. Remove welding flux immediately.

d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and welded surface matches contours of adjoining surfaces.

7. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts. Locate joints where least conspicuous.

8. Shop Assembly: Preassemble in shop to greatest extent possible to minimize field splicing and assembly. Use connections that maintain structural value of joined pieces. Clearly mark units for field assembly and coordinated installation.

E. Stair Framing: Fabricate stringers of structural steel channels. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers, newels, and framing members to stringers and headers. If using bolts, fabricate and join so that bolts are not exposed on finish surfaces.

1. Where masonry walls support steel stairs, provide temporary supporting struts designed for erection of steel stair components before installation of masonry.

2. Provide plate welded to top of stringer scribed to wall, to close off all gaps between stringers and walls.

F. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans indicated, but not less than that required, to support total design loading.

1. Form metal pans of uncoated cold-rolled steel sheet, or hot rolled when approved in advance by Architect.

2. Directly weld risers and subtreads to stringers; locate welds on side of metal pans to be concealed by concrete fill.

G. Provide subplatforms of configuration and construction indicated; if not indicated, of same metal as risers and subtreads, in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

H. For stair railings and handrails requirements, refer to Section 05 52 00

2.09 STEEL LADDERS

A. General: Fabricate ladders for the locations shown, with dimensions, spacings, and anchorages as indicated. Comply with requirements of ANSI A14.3.

1. For elevator pit ladders, comply with ASME A17.1.

B. Siderails: Continuous, steel, 1/2" x 2-1/2" flat bars, with eased edges, space 18" apart. Anchor to shaft wall at 4’-0” O.C. vertically on each siderail.

C. Bar Rungs: 3/4" diameter steel bars, spaced 12" o.c.

D. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.

E. Support each ladder at top and bottom and at intermediate points space not more than 5' o.c. with welded or bolted steel brackets.

F. Provide nonslip surfaces on top of each rung, either by coating the rung with aluminum-oxide granules set in epoxy-resin adhesive, or by using a type of manufacture rung that is filled with aluminum-oxide grout.

G. Provide ladder safety cages where required by local codes, to comply with ANSI A14.3.

2.10 ALTERNATING TREAD LADDER

A. Alternating Tread Stairs: Products by Lapeyre Stair Inc., New Orleans, LA (800/535-7631) or approved equal. Designed and constructed to meet or exceed applicable code requirements for load and safety requirements.

1. Material: Carbon steel.
2. Angle (from horizontal): 56 degrees typical; 68 degrees where required by space limitations.
3. Width: 23" overall.
4. Walking Surfaces: Formed metal with permanent non-skid surface.
   a. Treads: Minimum 13 gage.
   b. Landings: Minimum 11 gage,
5. Stringers: Minimum 2" x 1-3/4" x 11 gage with rubber cushion strip on center stringer.
6. Railing: 1-1/2" O.D. tubing or pipe. Manufacturer's standard configurations.
7. Finish: See SHOP FINISHES below. Rust inhibiting primer and enamel finish coats; final color to be determined by owner.

2.11 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.12 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Spacing of anchors shall not be more than 24" o.c.

2.13 PIPE BOLLARDS

A. ASTM A153 galvanized schedule 40 steel pipe with concrete fill, as detailed on Drawings. Provide smooth radius for concrete top to prevent accumulation of rainwater. Provide field painted finish.

2.14 LAUNDRY TRENCH GRATE

A. Manufactures:

1. Avendra, LLC Preferred Manufacturers:

   a. None:

2. Approved Manufacturers:

3. “Kordek PFR Isopthalic Polyester Resin”, Seasafe, Inc. (800-326-8842)

4. “Fibergrate Molded Gratings”, 1” x 1” x 4”; Fibergrate Composite Structures, Inc., An RPM Company (800-527-4043)

5. “Molded Square Fiberglass Gratings”; McNichols Co. (800-237-3828)

B. Provide square-mesh fiberglass grating, solid compression molded structure, 1” thick x size required, with bearing bars spaced at maximum 1” on center.

C. Accessories:

1. ½” round steel bars for lint screen.

D. Frame: Construct perimeter frame using 1” x 3” x 3/16” seat angle welded to 3” x 3” x 3/16” support steel angle to form seat for trench grate. Weld corners and grind smooth. Grate to be removable.

E. Forming and Finishing:

1. Form laundry trench using fabricated perimeter frame and concrete forms as required to depth and shape indicated.

2. Set top of perimeter seat angle flush with finish floor, allowing for thickness of finish material.

2.15 MISCELLANEOUS STEEL TRIM

A. Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.

1. Galvanize miscellaneous framing and supports in exterior locations and where shown to be painted.

2.16 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for “Architectural and Metal Products” for recommendations relative to application and designations of finishes. Finish metal fabrications after assembly.

2.17 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process in compliance with the following requirements:

1. ASTM A153 for galvanizing iron and steel hardware.

2. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications: Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning".

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

2.18 ELEVATOR SUPPORTS

A. Coordinate exact requirements with applicable Div 14 Elevator sections.

B. Hoist Beams: Provide for each hydraulic elevator.

2.19 METAL WALL BASE

A. Model: "MX-Series" by Elite Expressions, (866-556-6324) or approved equal. Designed and constructed to meet or exceed applicable code requirements and safety requirements.

1. Material: Stainless Steel.
2. Profile: As indicated on drawings.
3. Thickness: 0.030"
4. Grade: 304
5. Polish: #4 Finish
6. Adhesive: Full bed of polyurethane adhesive.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

B. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.02 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correctly welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

3.03 SETTING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set leveling and bearing plates on wedges, shims, or leveling nuts. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

1. Use nonmetallic nonshrink grout, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.04 INSTALLING PIPE BOLLARDS

A. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions. Slope group up approximately 1/8" toward bollard.

B. Paint bollards yellow in front of dumpsters.

3.05 INSTALLING METAL WALL BASE

A. Lengths: Provide base in 8'-0" lengths. Cut pieces less than 24 inches long not permitted unless required length of run is less.

B. Corners: Provide factory preformed internal and exterior corners. External mitered corners are not acceptable.

C. Terminal ends at base shall be beveled and toes rounded.

D. Adhere base to substrate in straight lines with top edges level and true and bottom edges fitted tightly and sealed to flooring material.

3.06 TOUCH-UP PAINTING: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA1 requirements for touch-up of field painted surfaces.

A. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

SECTION 05 52 00 - METAL RAILINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior Railings

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 05 50 00 - Metal Fabrications
3. Section 09 90 00 - Painting

1.02 DEFINITIONS

A. Definitions in ASTM E985 for railing-related terms apply to this Section.

1.03 PERFORMANCE REQUIREMENTS

A. General: In engineering handrail and railing systems to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. For Cold-Formed Structural Steel: AISI SG02 "North American Specification for Design of Cold-Formed Steel Structural Members".

B. Structural Performance of Handrails and Railing Systems: Engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.

1. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:

a. Designed to resist a load of 50 pounds per linear foot (pound per foot) applied in any direction at the top and to transfer this load through the supports to the structure.

b. Concentrated Load: Handrail assemblies and guards shall be able to resist a single concentrated load of 200 pounds applied in any direction at any point along the top, and have attachment devices and supporting structure to transfer this loading to appropriate structural elements of the building. This load need not be assumed to act concurrently with the loads specified in the paragraph above.

2. Intermediate Rails (all those except the handrail), balusters and panel fillers: Capable of withstanding the following loads applied as indicated.

a. Designed to withstand a horizontally applied normal load of 50 pounds on an area not to exceed 1 square foot including openings and space between rails.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

D. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of handrails and railings to prevent buckling, opening up of joints, overstressing of components, connections, and other detrimental effects. Base design calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 deg. F. ambient; 180deg. F. materials surfaces.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

1. Provide “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

a. Product data for each type of product specified.

b. Product test reports from and based on tests performed by qualified independent testing laboratory evidencing compliance of railing components and systems with requirements based on comprehensive testing of current products.

2. Shop Drawings showing fabrication and installation of handrails and railings including plans, elevations, sections, details of components, and attachments to other units of Work.

a. Where installed products are indicated to comply with certain design loadings, include structural computations, materials properties, and other information needed for structural analysis that has been signed and sealed by a qualified professional engineer responsible for their preparation.

3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

a. Quality welding processes and welding operators in accordance with the following:

1) AWS D1.1 "Structural Welding Code - Steel"

2) AWS D1.3 "Structural Welding Code - Sheet Steel"

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain handrails and railing systems of each type and material from a single manufacturer.

B. Engineering Responsibility: Engineer handrails and railing systems by qualified professional engineer legally authorized to practice in jurisdiction where Project is located.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry, protected against damage of any kind. Cover with waterproof paper, tarpaulin, or polyethylene sheeting; allow for air circulation inside the covering.

1.07 PROJECT CONDITIONS

A. Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.08 SEQUENCING

A. Sequence and coordinate installation of handrails and railings as follows:

1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.

2. Mount handrails only on gypsum board assemblies reinforced to receive anchors and where the location of concealed anchor plates has been clearly marked for benefit of

installer. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 PRODUCTS

2.01 METALS

A. General: Provide metal forms and types that comply with requirements of referenced standards and that are free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.

B. Steel Pipe: ASTM A53; finish, type, and weight class as follows:

1. Black finish, unless otherwise indicated.
2. Galvanized finish where indicated.
3. Type S, Grade A, standard weight (Schedule 40), unless otherwise indicated, or another weight required by structural loads.

C. Steel Plates, Shapes, and Bars: ASTM A36

D. Gray Iron Castings: ASTM A48, Class 30

E. Malleable Iron Castings: ASTM A47, Grade 32510

1. Bracket:
   a. Avendra, LLC Preferred Manufacturers:
      1) None
   b. Approved Manufacturers:
      1) “Model 382”; Julius Blum & Co., Inc. (800-526-6293)
      2) Approved Substitution

F. Fittings: Steel Elbows, Tee-Shapes, Wall Brackets, Escutcheons

G. Mounting: Brackets and Flanges: Steel inserts for casting or setting in new and existing concrete and with steel brackets for embedding into masonry.

H. Cast-In-Place and Post-Installed Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing per ASTM E488, conducted by a qualified independent testing laboratory.

1. Sleeves: For steel posts set in concrete, fabricate sleeves from steel pipe not less than 6 inches long with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

2.02 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this Section.

B. Avendra, LLC Preferred Manufacturers:

1. None

C. Approved Manufacturers:

1. "Euco N-S Grout", Euclid Chemical Co, An RPM Company; (800-321-7628)
2. "Masterflow 713", Degussa Building Systems, Inc (800-243-6739)

3. "Sonogrout 10K", Degussa Building Systems, Inc (800-243-6739)

D. Interior Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

E. Erosion-Resistant Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

2.03 PAINT

A. Shop Primer for Ferrous Metal: Manufacturers or Fabricators standard, fast-curing, lead and chromate-free, primer with performance requirements in FS TT-P-664; selected for resistance to normal atmosperic corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. "Carbozinc 621"; Carboline Co. (800-848-4645)

b. "Epoxy Zinc-Rich Primer CM18/CM19"; Benjamin Moore & Co. (888-236-6667)

c. "Tneme-Zinc 90-97"; Tnemec Co. (800-863-6321)

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers and complying with ASTM D1187.

2.04 WELDING MATERIALS, FASTENERS, AND ANCHORS

A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loadings.

1. For steel railings and fittings use plated fasteners complying with ASTM B633, Class Fe/Zen 25 for electro-deposited zinc coating.

2. Sleeves: For steel posts set in concrete, fabricate sleeves from steel pipe not less than 6 inches long with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

C. Fasteners for Interconnecting Railing Components: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials jointed.

1. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work except where exposed fasteners are unavoidable or are the standard fastening method for handrail and railing system indicated.

2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

2.05 FABRICATION

A. General: Fabricate handrails and railing systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacings, and anchorage, but not less than those required to support structural loads.

B. Preassemble railing systems in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of jointed pieces. Clearly mark units for reassembly and coordinated installation.

C. Form changes in direction of railing members as shown on Drawings.

D. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.

E. Welded Connections: Fabricate railing systems and handrails for connection of members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.

5. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

F. Nonwelded Connections: Fabricate railing systems and handrails for connection of members by means of railing manufacturer's standard concealed mechanical fasteners and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using epoxy structural adhesive where this represents manufacturer's standard splicing method.

G. Brackets, Flanges, Fittings and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings and anchors for interconnection of handrail and railing members to other work, unless otherwise indicated.

H. Provide inserts and other anchorage devices for connecting handrails and railing systems to concrete or masonry work. Fabricate anchorage devices which are capable of withstanding loadings imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.

I. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

J. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

K. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

L. For handrails and railing systems that are exposed to exterior or to moisture from condensation or other sources, provide weepholes or other means for evacuation of entrapped water in hollow sections of railing members.

M. Fabricate joints that will be exposed to weather in a manner to exclude water.

N. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

O. Fillers: Provide steel sheet or plate fillers of thickness and size n indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

2.06 STEEL FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Protect mechanical finishes on exposed surfaces from damage by application of strippable, temporary protective covering prior to shipment.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within 1/2 of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variation in appearance of other components is acceptable if they are within range of approved samples and they are assembled or installed to minimize contract.

D. Interior:

1. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications.

   a. Interiors (SSPC Zone 1A): SSPC-SP7 "Brush-Off Blast Cleaning".

2. Apply shop primer to uncoated surfaces of handrails and railing components, except those with galvanized finish or to be embedded in concrete or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

   a. Avendra, LLC Preferred Manufacturers:

      1) None

   b. Approved Manufacturers:

      1) "Carbozinc 621"; Carboline Co. (800-848-4645)

      2) "Epoxy Zinc-Rich Primer CM18/CM19"; Benjamin Moore & Co. (888-236-6667)

      3) "Tneme-Zinc 90-97"; Tnemec Co. (800-863-6321)

3. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete as masonry construction. Coordinate delivery of such items to project site.

3.02 INSTALLATION

A. Fit exposed connections accurately together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installation of handrails and railings. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.

2. Set posts plumb within a tolerance of 1/4 inch in 12 feet.

3. Align rails so that variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

D. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing handrails and railings to in-place construction.

3.03 ANCHORING POSTS

A. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by design loadings.

B. Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete where shown on Drawings. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

C. Anchor posts in concrete by core drilling holes, where shown on drawings, not less than 5 inches deep and 3/4 inch greater than outside diameter of post. Clean holes of all loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

1. Nonshrink, nonmetallic grout or anchoring cement.

3.04 RAILING CONNECTIONS

A. Nonwelded Connections: Use manufacturer's standard mechanical for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws with plastic filler cement colored to match finish of handrails and railing systems.

B. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.

3.05 ANCHORING RAIL ENDS

A. Anchor rail ends into concrete and masonry with round flanges connected to rail ends and anchored into wall construction with post-installed anchors and bolts.

B. Anchor rail end to metal surfaces with oval or round flanges.

3.06 ATTACHMENT OF HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets and wall return fittings to building construction as follows:

1. Use type of bracket with predrilled hole for exposed bolt anchorage.

2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.

3. For hollow masonry anchorage, use toggle bolts with square heads.

4. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.

3.07 ADJUSTING AND CLEANING

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

B. For Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair pint to comply with ASTM A780.

3.08 PROTECTION

A. Protect finishes of railing systems and handrails from damage during construction period by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop. Make required alterations and refinish entire unit or provide new units.

END OF SECTION

Revision Log

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber
2. Framing with engineered wood products
    a. Parallam parallel strand lumber (PSL),
    b. Microllam laminated veneer lumber (LVL)
    c. Timberstrand laminated strand lumber (LSL)
3. Framing with preservative-treated wood products
4. Rooftop equipment bases and support curbs
5. Wood furring, grounds, nailers, and blocking
6. Fasteners and metal framing anchors
7. Sheathing
    a. Wall Sheathing
    b. Roof Sheathing
8. Subflooring

B. Related Sections:

1. Section 06 17 53 – Shop Fabricated Wood Trusses
2. Section 06 20 00 - Finish Carpentry for nonstructural carpentry items exposed to view and not specified in another Section.
3. Section 12 30 00 - Architectural Woodwork
4. Section 10 28 00 - Toilet, Bath, and Laundry Accessories

1.02 References

A. American Wood-Preservers's Association (AWPA) Publications:

1. C2 "Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes"
2. C9 "Plywood - Preservative Treatment by Pressure Process Document Number"
3. M4 "Standard for the Care of Preservative-Treated Wood Products Document Number"

B. ASTM International Publications:

1. A153 "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"
2. A307 "Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength"
3. A563 "Standard Specification for Carbon and Alloy Steel Nuts"
4. A653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process"
5. C208 "Standard Specification for Cellulosic Fiber Insulating Board"

6. C578 "Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation"
7. C846 "Standard Practice for Application of Cellulosic Fiber Insulating Board for Wall Sheathing"
8. C954 "Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness"
9. C1177 "Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing"
10. D2559 "Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions"
11. D5055 "Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists"
12. E84 "Standard Test Method for Surface Burning Characteristics of Building Materials"
13. E699 "Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components"
14. F1667 "Standard Specification for Driven Fasteners: Nails, Spikes, and Staples"

C. The Engineered Wood Association (APA) Publications:

1. Form No. E30, "APA Engineered Wood Construction Guide"

1.03 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Exposed Framing: Dimension lumber not concealed by other construction and indicated to receive a stained or natural finish.

1.04 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data: For the following products submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project:

1. Engineered wood products
2. Underlayment
3. Metal framing anchors
4. Construction adhesives

C. LEED Submittals:

1. Certificates for Credit MR 6 Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
2. Product Data for Credit EQ 4.1: For adhesives, documentation including printed statement of VOC content.

3. Product Data for Credit EQ 4.4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
4. Laboratory Test Reports for Credit EQ 4: For adhesives and composite-wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee's (ALSC) Board of Review.

E. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:

1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.

F. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

G. Warranty of chemical treatment manufacturer for each type of treatment.

H. Shop Drawings: For Engineered Wood Framing Systems provide layout drawings indicating materials, member sizes, member spacing and accessories required for proper installation. Drawings shall clearly reference construction details, loading assumptions (including location of loads transferred from other levels), and minimum live load and total load deflection criteria.

1. Where installed products are indicated to comply with certain design loadings, include structural computations, materials properties, and other information needed for structural analysis that has been signed and sealed by a qualified professional engineer responsible for their preparation.

I. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

1. Engineered wood products

2. Metal framing anchors

3. Power-driven fasteners

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Owner’s Representative satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

B. Single-Source Responsibility for Engineered Wood Products: Obtain each type of engineered wood product from one source and by a single manufacturer.

C. Engineering Responsibility: Engineered Wood Framing Systems shall be engineered by qualified professional engineer legally authorized to practice in jurisdiction where Project is located.

D. Product Identification: All Engineered Wood Products System members shall be clearly marked with manufacturer's name, product series, plant identification, date of manufacture, and code compliance.

E. Installation Review: The Engineered Wood Products System Manufacturer's Technical Representative shall be available to meet with the Contractors to review installation details prior to the beginning of framing. The Contractor shall give notification to the Technical Representative prior to enclosing the framing to provide opportunity for review of the installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

2. Store Engineered Wood materials on dry surfaces supported on raised wood sticks located every 10 feet. Store TJI joists in an upright position.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Laminated-Veneer Lumber (LVL):

a. iLevel by Weyerhaeuser (800-456-4787)

2. Parallel-Strand Lumber (PSL):

a. iLevel by Weyerhaeuser (800-456-4787)

3. Prefabricated Wood I-Joists (TJI):

a. iLevel by Weyerhaeuser (800-456-4787)

4. Laminated Strand Lumber (LSL):

a. iLevel by Weyerhaeuser (800-456-4787)

5. Oriented Strand Board (OSB)

a. "Structurwood Sheathing"; iLevel by Weyerhaeuser (800-456-4787)

B. Approved Manufacturers:

1. Wood-Preservative-Treated Materials:

a. Hoover Treated Wood Products, Inc. (877-722-6292, ext. 211)

b. Osmose, Inc. (800-241-0240)

2. Fire-Retardant-Treated Materials, Interior Type A:

a. Hoover Treated Wood Products, Inc. (877-722-6292, ext. 211)

b. "FirePRO"; Osmose, Inc. (800-241-0240)

3. Fire-Retardant-Treated Materials, Exterior Type:

a. Hoover Treated Wood Products, Inc. (877-722-6292, ext. 211)

4. Laminated-Veneer Lumber (LVL):

a. "VERSA-LAM"; Boise Building Solutions (800-232-0788)

b. "Gang-Lam LVL"; Louisiana-Pacific Corp. (800-999-9105)

c. “RedLam LVL” RedBuilt (866-859-6757)

5. Parallel-Strand Lumber (PSL & LSL):
   a. Approved Substitutions
6. Prefabricated Wood I-Joists (TJI):
   a. Boise Building Solutions (800-232-0788)
   b. Louisiana-Pacific Corp. (800-999-9105)
   c. “RedLam LVL” RedBuilt (866-859-6757)
7. Oriented Strand Board (OSB)
   a. Approved Substitution
8. Glass-Fiber-Surfaced Gypsum Sheathing Board:
   a. “DensGlass Gold Exterior Guard”; Georgia-Pacific Corp. (800-284-5347)
   b. “GlasRoc Enhanced Glass Reinforced Gypsum Sheathing”; CertainTeed Corporation, a subsidiary of Saint-Gobain (800-233-8990)
   c. “Securock Glass-Mat Sheathing”; United States Gypsum Co. (800-950-3839)
   d. “Gold Bond Brand e^2XP Extended Exposure Sheathing”; National Gypsum Company. (800-628-4662)
9. Metal Framing Anchors:
   a. Hilti, Inc. (800-879-8000)
   b. Cleveland Steel Specialty Co. (800-251-8351)
   c. USP Lumber Connectors (800-328-5934)
   d. Simpson Strong-Tie Company, Inc. (800-999-5099)
   e. EMCO/Southeastern Metals/A Gibralter Co. (800-690-7235)

2.02 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
   1. NELMA - Northeastern Lumber Manufacturers Association.
   2. NLGA - National Lumber Grades Authority (Canadian).
   3. RIS - Redwood Inspection Service.
   4. SPIB - Southern Pine Inspection Bureau.
   5. WCLIB - West Coast Lumber Inspection Bureau.
   6. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.

D. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

1. Provide dressed lumber, S4S, unless otherwise indicated.

2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

3. Provide lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.03 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Do not use chemicals containing chromium or arsenic.

2. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

B. Pressure treat above ground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

3. Wood framing members less than 18 inches above grade.

4. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft.

D. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.04 DIMENSION LUMBER

1. General: Refer to Structural Drawings for information.

2.05 BOARDS

A. Concealed Boards: Where boards will be concealed by other work, provide lumber with 15 percent maximum moisture content and of following species and grade:

1. Species and Grade: Spruce-pine-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.

2.06 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 15 percent maximum for lumber items not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.07 ENGINEERED WOOD PRODUCTS

A. General: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that evidence compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Laminated-Veneer Lumber: Lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D2559 to produce members with grain of veneers parallel to their lengths. Comply with the following requirements:

1. Extreme Fiber Stress in Bending: 2,600 psi for 12-inch nominal-depth members.
2. Modulus of Elasticity: 1,900,000 psi
3. Tension Parallel to Grain: 1,555 psi
4. Compression Parallel to Grain: 2,510 psi
5. Compression Perpendicular to Grain: 750 psi perpendicular to and 480 psi parallel to glue line.
6. Horizontal Shear: 285 psi perpendicular to and 190 psi parallel to glue line.

C. Parallel-Strand Lumber: Lumber manufactured by laying up wood strands using an exterior-type adhesive complying with ASTM D 2559, and cured under pressure to produce members with grain of strands parallel to their lengths and complying with the following requirements:

1. Extreme Fiber Stress in Bending: 2900 psi for 12-inch nominal-depth members.
2. Modulus of Elasticity: 2,000,000 psi
3. Tension Parallel to Grain: 2,025 psi
4. Compression Parallel to Grain: 2,900 psi
5. Compression Perpendicular to Grain: 750 psi perpendicular to and 475 psi and parallel to wide face of strands.
6. Horizontal Shear: 210 psi perpendicular to and 290 psi and parallel to wide face of strands.

D. Prefabricated Wood I-Joists: Units manufactured by bonding stress-graded lumber flanges to wood-based structural-use panel webs with exterior-type adhesives complying with ASTM D 2559, produce I-shaped joists complying with the following requirements:

1. Provide continuous "Microllam LVL flanges", by iLevel by Weyerhaeuser or approved substitution by other listed manufacturers free from finger or scarf joints for the length of the joists.
2. Provide webs manufactured from "Performance Plus Panels", by iLevel by Weyerhaeuser, or approved substitution by other listed manufacturers, with saw tooth edge detail interlocked and glued at panel joints. Joist web material must not exceed 12% tested average thickness swell due to moisture.
3. Structural Capacities: Establish and monitor structural capacities according to ASTM D5055.
4. Sizes: Depths and widths as indicated, with flanges not less than 1-1/2 inches in actual width.

E. Prefabricated Wood Rim Joists:

1. "Timberstrand LSL Rim Joist" as manufactured by iLevel by Weyerhaeuser or approved substitution by other listed manufacturers.
2. Construction: Solid 1-1/8" thick piece of laminated strand lumber sized to match depth of joist.
3. Design Values:
   a. Refer to Structural Drawings for Information

F. Microllam LVL Beams:

1. "Microllam LVL" as manufactured by iLevel by Weyerhaeuser or approved substitution by other listed manufacturers.
2. Construction: Continuous laminated veneer lumber free from finger or scarf joints. Stress graded veneers bonded with waterproof adhesive with face grain parallel to each adjacent layer. Provide Watershed Overlay coating and edge seal to prevent cupping and moisture damage.
3. Design Values: .
   a. Refer to Structural Drawings for Information

G. Parallam PSL Beams:

1. "Parallam PSL" as manufactured by iLevel by Weyerhaeuser, or approved substitution by other listed manufacturers.
2. Construction: Continuous parallel strand lumber bonded with waterproof adhesives and formed into billets. Beams shall be of single ply construction and free from finger joints or splices for full length of span.
3. Design Values:
   a. Refer to Structural Drawings for Information

H. Laminated Strand Lumber (LSL) Headers:

1. "Timberstrand LSL Headers" as manufactured by iLevel by Weyerhaeuser, or approved substitution by other listed manufacturers.
2. Construction: Laminated strand lumber; strands of aspen or yellow poplar bonded with waterproof resins; cured using a steam injection process.

2.08 WOOD-BASED STRUCTURAL-USE PANELS, GENERAL

A. Refer to Structural Drawings for Information.

2.09 CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

A. General: Where structural-use panels are indicated for the following concealed types of applications, provide APA-performance-rated panels complying with requirements designated under each application for grade, span rating, exposure durability classification, and edge detail (where applicable).

1. Thickness: Provide panels meeting requirements specified but not less than thickness indicated.

2. Span Ratings: Provide panels with span ratings required to meet "Code Plus" provisions of APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial."

B. Combination Subfloor-Underlayment: APA-rated Sturd-I-Floor Plywood Sheathing.

1. Exposure Durability Classification: Exposure 1.

2. Span Rating: As indicated.

3. Minimum Thickness: 23/32 inches.

4. Edge Detail: Square edge, tongue and groove

5. Surface Finish: Fully sanded face.

6. Refer to Section 01 23 00 - ALTERNATES.

C. Sub-Floor Sheathing – OSB rated Sturd-I-Floor.

1. Exposure Durability Classification: Exposure 1

2. Span Rating: As indicated.

3. Minimum Thickness: 23/32 inches.

4. Edge Detail: Square edge, tongue and groove.

5. Refer to Section 01 23 00 - ALTERNATES.

D. Wall Sheathing - Oriented-Strand-Board:

1. Exposure Durability Classification: Exposure 1

2. Span Rating: 32/16

3. Minimum Thickness: As shown on Drawings.

E. Roof Sheathing - Oriented-Strand-Board:

1. Exposure Durability Classification: As shown on Drawings

2. Span Rating: As shown on Drawings

3. Minimum Thickness: As shown on Drawings.

2.10 STRUCTURAL-USE PANELS FOR BACKING

A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch thick.

2.11 GYPSUM SHEATHING

A. Glass-Fiber-Surfaced Gypsum Sheathing Board: Gypsum sheathing board consisting of noncombustible gypsum core incorporating a water-resistant material, surfaced on face and back with glass-fiber mats with alkali-resistant coating, and with unsurfaced square edges; complying with ASTM C71177, and requirements indicated below:

1. Type: Type X or as noted on the drawings.

2. Thickness: 5/8” unless indicated otherwise.

2.12 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, contains preservative treatment, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating G185 per ASTM A153 or of Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117. Attach sheathing to comply with ASTM C954.

G. Lag Bolts: ASME B18.2.1.

H. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers.

2.13 METAL FRAMING ANCHORS

A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for Project.

2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

C. Joist Hangers: U-shaped joist hangers with 2-inch-long seat and 1-1/4-inch-wide nailing flanges at least 85 percent of joist depth.

1. Thickness: As indicated on the Structural Drawings.

D. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

1. Strap Width: As indicated on the Structural Drawings.

2. Thickness: As indicated on the Structural Drawings.

3. Designed for connection of engineered wood products, sized to support design loads.

E. Bridging: Rigid, V-section, nailless type, 0.064 inch thick, length to suit joist size and spacing.

F. Post Bases: As indicated on Structural Drawings

G. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

1. Width: As indicated on the Structural Drawings.

2. Thickness: As indicated on the Structural Drawings.

3. Length: As indicated on the Structural Drawings.

H. Rafter Tie-Downs (Hurricane Ties): As indicated on the Structural Drawings.

I. Floor-to-Floor Ties: Flat straps as indicated on the Structural Drawings.

2.14 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

B. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbonate (IPBC) as its active ingredient.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. "Table 2304.9.1 - Fastening Schedule" of the International Building Code.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

G. Use hot-dip galvanized or stainless-steel nails where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity.

H. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

3.02 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.03 WOOD FURRING

A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

1. Firestop furred spaces of walls at each floor level and at ceiling with wood blocking or noncombustible materials, accurately fitted to close furred spaces.

B. Furring to Receive Plywood Paneling: Install 1-by-3-inch nominal-size furring at 24 inches o.c., horizontally and vertically. Select furring with no knots capable of producing bent-over nails and damage to paneling.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring at 16 inches o.c., vertically.

3.04 WOOD FRAMING, GENERAL

A. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Install framing members of size and at spacing indicated.

D. Do not splice structural members between supports.

E. Firestop concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where firestopping is not inherent in framing system used, provide closely fitted wood blocks of 2-inch nominal-thickness lumber of same width as framing members.

F. Comply with Table 2304.9.1 and Section 2304 of the International Building Code for minimum fastening requirements of wood members, and published requirements of metal fastener manufacturer, whichever is more stringent.

3.05 WALL AND PARTITION FRAMING

A. General: Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs; except single top plate may be used for non-load-bearing partitions. Nail or anchor plates to supporting construction, unless otherwise indicated.

B. Construct corners and intersections with 3 or more studs. Provide miscellaneous blocking and framing as shown and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide continuous horizontal blocking at midheight of single-story partitions and multistory partitions, using members of 2-inch nominal thickness and of same width as wall or partitions.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.

1. For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal depth for openings 36 inches and less in width, and not less than 6-inch nominal depth for wider openings.

2. For load-bearing walls, refer to Structural Drawings.

3.06 FLOOR JOIST FRAMING

A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:

1. Where supported on wood members, by toe nailing or by using metal framing anchors.

2. Where framed into wood supporting members, by using wood ledgers as shown or, if not shown, by using metal joist hangers.

B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.

C. Do not notch in middle third of joists; limit notches to 1/6 depth of joist, 1/3 at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.

D. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.

E. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.

F. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c. extending over and fastening to 3 joists. Embed anchors at least 4 inches into masonry with ends bent at right angles 4 inches into grouted masonry.

G. Under jamb studs at openings, provide solid blocking between joist.

H. Prefabricated Wood I-Joists:

1. Comply with manufacturer’s written instructions for design, installation, and fastening.

2. Design Loads: Joists shall be sized to support loads indicated on drawings and reviewed by a Registered Engineer in the employ of the joist manufacturer.

3. Allowable deflection:

a. Floor Joists: L/360 live load deflection; L/240 total load deflection.

4. Permanently bond the subfloor to the joists using waterproof construction adhesive and nails.

5. End Bearing: 1-3/4” minimum bearing with Timberstrand LSL rim joist.

6. Intermediate bearing: 3-1/2” minimum bearing. Blocking panels shall be installed between the joists when load bearing walls are located above the bearing point.

I. Engineered Wood Beams

1. Comply with manufacturer’s written instructions for design, installation, and fastening.

2. Design Loads: Beams shall be sized to support loads indicated on drawings.

3. Allowable deflection:
    a. Floor Beams: L360 live load deflection; L240 total load deflection.
    b. Roof Beams: L/180 total load deflection.
4. Protect wood members from direct contact with concrete or masonry.
5. Refer to manufacturers literature for connection of multiple plies of side loaded beams.

3.07 RAFTER AND CEILING JOIST FRAMING

A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
    1. Where ceiling joists are at right angles to rafters, provide additional short joists perpendicular to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal-size or 2-by-4-inch nominal-size stringers spaced 48 inches o.c. crosswise over main ceiling joists.

B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
    1. At valleys, provide double-valley rafters of size shown or, if not shown, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
    2. At hips, provide hip rafter of size shown or, if not shown, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.

C. Provide special framing as shown for eaves, overhangs, dormers, and similar conditions, if any.

D. Engineered Wood Beams
    1. Comply with manufacturer's written instructions for design, installation, and fastening.
    2. Design Loads: Beams shall be sized to support loads indicated on drawings.
    3. Allowable deflection:
        a. Floor Beams: L360 live load deflection; L240 total load deflection.
        b. Roof Beams: L/180 total load deflection.
    4. Protect wood members from direct contact with concrete or masonry.
    5. Refer to manufacturers literature for connection of multiple plies of side loaded beams.

3.08 STAIR FRAMING

A. Provide stair framing members of size, space, and configuration indicated or, if not otherwise indicated, to comply with the following requirements:
    1. Stringer Size: 2-by-12-inch nominal-size minimum.
    2. Notching: Notch stringers to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
    3. Stringer Spacing: At least 3 stringers for each 36-inch clear width of stair, 4 stringers for 48" clear width of stair.

B. Provide stair framing that does not exceed the following variations between treads and risers within each flight:

1. Adjacent Treads and Risers: 3/16 inch.
2. Between Largest and Smallest Treads and Risers: 3/8 inch.

3.09 INSTALLATION OF STRUCTURAL-USE PANELS

A. General: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
   1. Comply with "Code Plus" provisions of above-referenced guide.

B. Securely attach to substrate by fastening as indicated, complying with the following:
   1. ICC NER-272 for power-driven fasteners.
   2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

D. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

E. Fastening Methods: Fasten panels as indicated below:
   1. Combination Subflooring-Underlayment: Glue and nail to framing throughout.
   2. Subflooring: Glue and nail to framing throughout.
      a. Space panels 1/8 inch at edges and ends.
   3. Sheathing:
      a. Nail to wood framing.
      b. Space panels 1/8 inch at edges and ends.
   4. Underlayment: Nail to subflooring.
      a. Space panels 1/32 inch at edges and ends.
      b. Fill and sand edge joints of underlayment receiving resilient flooring just before installing flooring.
   5. Plywood Backing Panels: Nail or screw to supports.
   6. Lay-out panels with face grain oriented perpendicular to the supporting members.
   7. Install roof sheathing with panel clips at all edges.

3.10 GYPSUM SHEATHING

A. General: Install gypsum sheathing to comply with manufacturer’s instructions, GA-253, and the following:
   1. Cut boards at penetrations, edge, and other obstructions of the work. Fit tightly against abutting construction, except provide a 3/8” setback where non-load-bearing construction abuts structural elements.
   2. Coordinate sheathing installation with flashing and joint sealant installation so that these combined materials are installed in the sequence and manner that prevents exterior moisture from passing through completed exterior wall assembly.
   3. Apply fasteners so that screw heads bear tightly against face of gypsum sheathing boards, but do not cut into face paper.

4. Do not bridge building expansion joints with gypsum sheathing. Cut and space edges to match spacing of structural support elements.

B. Vertical Installation: Install four-foot-wide gypsum sheathing boards vertically with vertical edges centered over flanges of studs. Abut ends and edges of each board with those of adjoining boards. Screw-attach boards at perimeter and within field of board to each steel stud a follows:

1. Fasteners spaced approximately 8” o.c. and set-back 3/8” minimum from edges and ends of boards.

END OF SECTION

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SECTION 06 17 53 - SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Parallel-Chord Roof Trusses, Top-Chord Bearing
2. Girder Trusses
3. Parallel-Chord Floor Trusses, Bottom-Chord Bearing
4. Truss Accessories

B. Related Sections:

1. Section 05 50 00 - Metal Fabrications
2. Section 06 10 00 - Rough Carpentry permanent bracing

1.02 DEFINITIONS

A. Metal-plate-connected wood trusses include planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate, and erect metal-plate-connected wood trusses to withstand design loads within limits and under conditions required.

1. Design Loads: As indicated.
2. Design trusses to withstand design loads without deflections greater than the following:
   a. Roof Trusses: Vertical deflection of 1/240 of span due to total load.
   b. Roof Trusses: Horizontal deflection at reactions of 1-1/4 inches due to total load.
   c. Floor Trusses: Vertical deflection of 1/480 of span due to live load.

B. Engineering Responsibility: Engage a fabricator who uses a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for metal-plate-connected wood trusses.

1.04 SUBMITTALS

A. Product Data: For lumber, metal-plate connectors, metal framing connectors, bolts, and fasteners.

1. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in project.

B. Shop Drawings detailing location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes, and stress grades of lumber to be used; splice details; type, size, material, finish, design values, and orientation and location of metal connector plates; and bearing details.

1. To the extent truss design considerations are indicated as fabricator's responsibility, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Include truss Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

C. Product certificates signed by officer of truss fabricating firm certifying that metal-plate-connected wood trusses supplied for Project comply with specified requirements and Shop Drawings.

D. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee (ALSC) Board of Review.

F. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

1. Metal-plate connectors
2. Metal framing connectors

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer with a minimum of five years of experience, who has completed wood truss projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator's Qualifications: Engage a firm that complies with the following requirements for quality control and is experienced in fabricating metal-plate-connected wood trusses similar to those indicated for this Project and with a record of successful in-service performance:

1. Fabricator participates in a recognized quality-assurance program that involves inspection by SPIB; Timber Products Inspection, Inc.; Truss Plate Institute (TPI); or other independent inspecting and testing agency acceptable to Architect and authorities having jurisdiction.

C. Comply with applicable requirements and recommendations of the following publications:

1. ANSI/TP1 1, "National Design Standard for Metal-Plate-Connected Wood Truss Construction."
2. TPI HIB "Commentary and Recommendations for Handling Installing & Bracing Metal Plate Connected Wood Trusses."
3. TPI DSB "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."

D. Metal-Plate Connector Manufacturer's Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in ANSI/TPI 1.

E. Single-Source Responsibility for Connector Plates: Provide metal connector plates from one source and by a single manufacturer.

F. Single-Source Engineering Responsibility: Provide trusses engineered by metal-plate connector manufacturer to support superimposed dead and live loads indicated, with design approved and certified by a qualified professional engineer.

G. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated that have resulted in installing metal-plate-connected wood trusses similar to those indicated for this Project and with a record of successful in-service performance.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses with care and comply with manufacturer's written instructions and TPI recommendations to avoid damage and lateral bending.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.07 SEQUENCING AND SCHEDULING

A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Metal Connector Plates:

a. None

2. Metal Framing Anchors:

a. None

B. Approved Manufacturers:

1. Metal Connector Plates:

a. Alpine Engineered Products, Inc. (800-735-8055)

b. Mitek Industries, Inc. (800-325-8075)

c. Truswal Systems Corporation (800-521-9790)

d. USP Lumber Connectors (800-328-5934)

e. Approved substitution

2. Metal Framing Anchors:

a. Hilti, Inc. (800-879-8000)

b. Mitek Industries, Inc. (800-325-8075)

c. Truswal Systems Corporation (800-521-9790)

d. USP Lumber Connectors (800-328-5934)

e. Simpson Strong-Tie Company, Inc. (800-999-5099)

f. Approved substitution

2.02 DIMENSION LUMBER

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association

2. NLGA - National Lumber Grades Authority (Canadian)

3. SPIB - Southern Pine Inspection Bureau

4. WCLIB - West Coast Lumber Inspection Bureau

5. WWPA - Western Wood Products Association

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

D. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified, to comply with requirements indicated below:

1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

E. Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AFPA's "National Design Specification for Wood Construction" and its "Supplement."

2.03 METAL CONNECTOR PLATES

A. General: Fabricate connector plates from metal complying with requirements indicated below.

1. Interior locations:

a. Hot-Dip Galvanized Steel Sheet: Structural-quality steel sheet, zinc coated by hot-dip process complying with ASTM A653, Structural Steel, (SS), high strength low alloy steel, Type A, G60 coating designation; Grade 33 and not less than 0.0359 inch thick.

b. Electrolytic Zinc-Coated Steel Sheet: ASTM A591, structural-(physical) quality steel sheet, zinc coated by electrodeposition; 33,000-psi minimum yield strength, coating class C, and not less than 0.0474 inch thick.

c. Aluminum-Zinc Alloy-Coated Steel Sheet: Structural-(physical) quality steel sheet, aluminum-zinc alloy-coated by hot-dip process complying with ASTM A792, AZ50 coating designation; Grade 33 and not less than 0.0359 inch thick.

2. Exterior Locations, or where otherwise indicated:

a. Stainless-Steel Sheet: ASTM A666, Type 304 or 316, chromium nickel steel sheet; 33,000-psi minimum yield strength and not less than 0.035 inch thick.

2.04 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified below for material and manufacture.

1. Where truss members are exposed to weather or to high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A153 or of stainless steel, Type 304 or 316.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: ICC NER-272.

D. Wood Screws: ASME B18.2.1.

E. Lag Bolts and Screws: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers.

G. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

2.05 METAL FRAMING ANCHORS

A. General: Provide metal framing anchors of structural capacity, type, size, metal, and finish indicated that comply with requirements specified, including the following:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for this Project.

2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

C. Stainless-Steel Sheet: ASTM A666, Type 304 or 316, chromium nickel steel sheet; 33,000-psi minimum yield strength.

2.06 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

B. Protective Coatings: Provide one of the following coating systems:

1. SSPC-Paint 22, epoxy-polyamide primer.

2. SSPC-Paint 16, coal-tar epoxy-polyamide black or dark red paint.

3. SSPC-Paint 27 and SSPC-Paint 12, basic zinc chromate-vinyl butyral wash primer and cold-applied asphalt mastic.

2.07 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to size, configuration, thickness, and anchorage details required to withstand design loadings for types of joint designs indicated.

C. Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances of ANSI/TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances of ANSI/TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously into both sides of wood members by air or hydraulic press.

PART 3 EXECUTION

3.01 INSTALLATION

A. Do not install wood trusses until supporting construction is in place and is braced and secured.

B. Before installing, splice trusses delivered to Project site in more than one piece.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to recommendations of TPI and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space, adjust, and align trusses in location before permanently fastening and as indicated on drawings.

G. Anchor trusses securely at all bearing points using metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.

1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

1. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

J. Install wood trusses within installation tolerances of ANSI/TPI 1.

K. Do not cut or remove truss members.

L. Return wood trusses that are damaged or do not meet requirements to fabricator and replace with trusses that do meet requirements.

1. Do not alter trusses in the field.

3.02 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

END OF SECTION

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SECTION 06 20 00 - FINISH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wood Millwork
    a. Interior Standing and Running Trim
    b. Exterior Standing and Running Trim
2. Wood Shelving

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 09 21 16 - Gypsum Board Assemblies
3. Section 09 90 00 - Painting
4. Section 12 30 00 - Architectural Woodwork
5. Division 26 – Electrical

1.02 REFERENCES

A. DOC PS 1 "Construction and Industrial Plywood"

B. DOC PS 20 "American Softwood Lumber Standard"

C. ANSI/AF&PA NDS-2005: "National Design Specification (NDS) for Wood Construction".

D. ANSI/HPVA HP-1: "American National Standard for Hardwood and Decorative Plywood"

E. AWI Quality Standards

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit Product Data and Shop Drawings indicating component profiles and fastening and joining details.
2. Samples for initial selection of the following in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.
3. Samples for verification of the following:
    a. Lumber products with factory-applied finish, 50 sq. in. for lumber for each finish system and color.
    b. Linear Moldings: 2-foot-long section with finished joint. Show complete pattern.
    c. Nonlinear Shapes: Full-size unit.

B. Shop Drawings: Show profiles, thicknesses, finishes, joints, ornamentation, installation tolerances, and anchorage details. Indicate attachment methods, embedded supports, reinforcement, fabrication methods, joint treatments, clearances, and supports.

1. Show connection to suspension system and cutouts for sprinklers, diffusers, grilles, speakers, and lighting fixtures.
2. Rear Courtyard Trellis:
    a. Show layouts, finish, trim, installation details, material composition, and thickness.
    b. Show elevations, plan location, and sections.

C. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives and glues used at Project site, including printed statement of VOC content.
2. Product Data for Credit EQ 4.4: For composite-wood products, documentation indicating that product contains no urea formaldehyde.
3. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
    a. Include statement indicating costs for each certified wood product.

1.05 QUALITY ASSURANCE

A. Factory-mark each piece of lumber and plywood with type, grade, mill, and grading agency identification; except omit marking from surfaces to receive transparent finish, and submit mill certificate that material has been inspected and graded in accordance with requirements if it cannot be marked on a concealed surface.

B. Perform finish carpentry work in accordance with AWI Quality Standards, Custom Grade.

C. Fire-Test-Response Characteristics: Provide glass-reinforced gypsum fabrications with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another independent testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame Spread: 25 or less.
2. Smoke Developed: 450 or less.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect finish carpentry materials during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.

B. Do not deliver finish carpentry materials, until painting, wet work, grinding, and similar operations which could damage, soil, or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

C. Ship and store glass-reinforced gypsum fabrications in factory-wrapped crates, packaged to keep units dry. Avoid cracking, warping, or staining the units.

1.07 PROJECT CONDITIONS

A. Conditioning: Installer shall advise Contractor of temperature and humidity requirements for finish carpentry installation areas.

B. Environmental Limitations: Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels throughout the remainder of construction period.

1. Maintain temperature and humidity in installation area as required to maintain moisture content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity.

2. Acclimatize glass-reinforced gypsum fabrications to ambient temperature and humidity of spaces in which they will be installed. Remove packaging and move units into installation spaces not less than 48 hours before installing them.

C. Weather Limitations: Proceed with installing exterior finish carpentry only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

D. Field Measurements: Where glass-reinforced gypsum fabrications are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.08 COORDINATION

A. Coordinate layout and installation of glass-reinforced gypsum fabrications and suspension system components with other construction, including ceilings, light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Lumber standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NeLMA - Northeastern Lumber Manufacturers Association

2. NLGA - National Lumber Grades Authority

3. WCLIB - West Coast Lumber Inspection Bureau

4. WWPA - Western Wood Products Association

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

D. Softwood Plywood: Comply with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood."

E. Hardwood Plywood: Comply with ANSI/HPVA HP-1, "Interim Voluntary Standard for Hardwood and Decorative Plywood."

2.02 INTERIOR STANDING AND RUNNING TRIM

A. Hardwood Lumber: PS 58; Premium Grade in accordance with AWI; maximum moisture content of 15 percent.

Note: Coordinate selection of wood species with décor scheme stain shown in Interior Finish Index and Section 12 30 00.

1. Stained Interior Wood Trim and Millwork: Yellow Birch - "Select White" (Sapwood), Grade 1, solid lumber stock, sizes and shapes shown on Drawings, of straight grain type sufficient to receive stained finish, smooth surfaced.

2. Painted Interior Wood Trim and Millwork: Poplar, Paint Grade, solid lumber stock, sizes and shapes shown on Drawings, of grain type sufficient to receive stained finish, smooth surfaced.

B. Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to the actual sizes as required by PS 20 or to actual sizes and patterns as shown, unless otherwise indicated.

2.03 EXTERIOR STANDING AND RUNNING TRIM

A. Lumber Trim: Provide finished lumber and moldings complying with the following requirements including those of the grading agency listed with species:

1. Species: Redwood or Western Red Cedar; WCLIB, grade as follows:

a. Cedar Grade: Select and Quality Knotty

b. Redwood Grade: Clear

2. Texture: Smooth surfaced

3. Lumber for Transparent Finish (Stained or Clear): Solid lumber stock.

B. Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to the actual sizes as required by PS 20 or to actual sizes and patterns as shown, unless otherwise indicated.

2.04 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide nails, screws, and other anchoring devices of the type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible, and complying with applicable Federal Specifications. Provide in sufficient length to penetrate minimum of 1-1/2 inches into substrate, unless otherwise recommended by manufacturer.

1. Where finish carpentry is exposed on exterior or in areas of high relative humidity, provide fasteners and anchorages with a hot-dipped zinc coating (ASTM A-153), or stainless steel.

2.05 FABRICATION – WOOD FINISH CARPENTRY

A. Wood Moisture Content: Comply with requirements of specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry on relative humidity conditions existing during time of fabrication and in installation areas.

B. Fabricate finish carpentry to dimensions, profiles, and details indicated.

1. Back out or kerf backs of the following members, except members with ends exposed in finished work:
    a. Interior standing and running trim, except shoe mold and crown mold.
2. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1-1/6 inch (1.5 mm) radius.

2.06 SHEET MATERIALS

A. Shelving: 3/4" thick by width shown on Drawings, Hardwood Plywood: PS 51; custom grade in accordance with AWI; core material of veneer; type of bond recommended for application; with minimum 3/4" x 1-1/4" hardwood nosing.

B. Softwood Plywood: DOC PS 1, Medium Density Overlay.

2.07 FIRE RETARDANT TREATED (FRT) LUMBER

A. Marketplace Preferred Program Manufacturers:
    1. None

B. Approved Manufacturers:
    1. Lumber:
        a. Dricon FRT"; Archwood Protection Inc. (770-801-6600)
        b. "Pyro-Guard"; Hoover Treated Wood Products, Inc. (877-722-6292, ext. 211)
        c. "FirePRO FR Lumber"; Osmose Wood Preserving, Inc. (404-228-8434)
    2. Plywood:
        a. "Exterior Fire-X"; Hoover Treated Wood Products, Inc. (877-722-6292, ext. 211)

C. Flamespread and smoke developed ratings of 25 or less by ASTM E84, with no sign of progressive combustion when test is extended to 30 minutes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerance and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

C. Prime and backprime lumber for painted finish exposed on the exterior not indicated as factory prefinished. Comply with requirements for surface preparation and application in Division 09 Section "Painting."

D. Ensure that all electrical or other services are in place.

3.03 INSTALLATION – FINISH CARPENTRY

A. Discard units of material which are unsound, warped, bowed, twisted improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements. Do not use manufactured units with defective surfaces, sizes, or patterns.

B. Install the work plumb, level, true, and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level countertops; and with 1/16" maximum offset in flush adjoining 1/8" maximum offsets in revealed adjoining surfaces.

C. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

D. Countersink nails, fill surface flush, and sand where face nailing is unavoidable.

E. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) for plumb and level. Install adjoining finish carpentry with 1/32 inch (0.8 mm) maximum offset for flush installation and 1/16 inch (1.5 mm) maximum offset for reveal installation.

F. Coordinate finish carpentry with materials and systems in or adjacent to standing and running trim and rails. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim and rails.

G. Finish according to specified requirements.

H. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailings, countersunk and filled flush with finished surface, and matching final finish where transparent is indicated.

3.04 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, if required.

1. Match color and grain pattern across joints.
2. Install trim after gypsum board joint finishing operations are completed.
3. Drill pilot holes in hardwood before fastening to prevent spitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.
4. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

3.05 PANELING INSTALLATION

A. Arrange panels on each wall to minimize variations in grain and color between each adjacent panel. Attach panels to substrate using panel adhesive and fasteners. Conceal fasteners where possible.

3.06 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION

A. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

B. Clean finish carpentry work on exposed and semi-exposed surfaces. Touch-up factory-applied finishes to restore damaged or soiled areas.

C. Preparation for Finishing: Sand work smooth and set all nails and screws. Apply wood filler in exposed nail and screw indentations.

D. Cleaning: Keep premises in a neat, safe, and orderly condition at all times during execution of this portion of the work, free from the accumulation of sawdust, cut-ends, and debris.

E. Refer to Division 09 sections for final finishing of installed finish carpentry work.

F. Protection: Installer of finish carpentry work shall advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION

Revision Log

SECTION 06 61 13 - CULTURED MARBLE FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cast Polymer

a. Tub and Shower Surrounds

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 06 20 00 - Finish Carpentry
3. Section 12 30 00 - Architectural Woodwork
4. Section 12 36 61.13 – Cultured Marble Countertops
5. Division 22 for Plumbing Fixtures

1.02 REFERENCES

A. FS MMM-A-130 - Adhesive, Contact

B. Architectural Woodwork Institute (AWI): "Architectural Woodwork Quality Standards"

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit Shop Drawings and product data. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

a. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

b. Samples for Initial Selection: For each type of material exposed to view.

2. LEED Submittals:

a. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.

b. Credit EQ 4: Laboratory test reports for adhesives and sealants indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.

c. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

1.04 QUALITY ASSURANCE

A. Tub/Shower surrounds, window stools, and lavatory/vanity countertops shall be supplied by one manufacturer. Where shown to be the same color, the color of the components shall match for all items. Refer to Interior Finish Index for colors.

B. Allowable Tolerances:

1. Variation in component size: +/- 1/8 inch.

2. Location of openings: +/- 1/8 inch from indicated location.

C. Perform work to (custom) quality in accordance with "Quality Standards" of the Architectural Woodwork Institute (AWI).

D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cast polymer materials until painting and similar operations that could damage synthetic marble have been completed in installation areas. If cast polymer materials must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cast polymer materials until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cast polymer materials are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cast polymer materials work by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.07 SPECIAL WARRANTY

A. Cast polymer materials:

1. Provide one (1) year Warranty against manufacturing defects.

PART 2 PRODUCTS

2.01 CAST POLYMER:

A. Manufacturers:

1. Avendra, LLC Preferred Manufacturers:

a. Simulated Tile Tub/Shower Surrounds:

1) None.

2. Approved Manufacturers:

a. Simulated Tile Tub/Shower Surrounds:

1) Mincey Marble Manufacturing Co. (800-533-1806)

2) Introsul, Inc. (478-987-3185 x 223)

3) Imperial Marble Corporation (815-498-2303)

B. Fire Hazard Ratings:

1. Classified in accordance local codes and ordinances, ASTM E84 and the following:

a. Class C

b. Flame Spread: Class C: 76 - 200

c. Smoke Developed: 0-450

2. Subject to compliance with requirements, all products shall be permanently marked on the back side and provided with a temporary removable label on the front side with language clearly certifying compliance with ASTM E84 and indentifying the required Flame Spread Class Rating.

C. Tub/Shower Surrounds:

1. Homogeneous minimum 1/4" thick molded panels. Surrounds to be cast polymer wall panels; installed as indicated on Drawings. No horizontal seams or trim strips permitted. Provide one piece for each wall. Joints will be permitted at corners only. Sizes as shown on Drawings. Color and Pattern as shown on Interior Finish Index.

a. Surround Pattern:

1) Unless shown otherwise, provide custom "Tile-Like" pattern with 6" high x 24" wide tile size and 3/32" to 1/8" simulated grout joint width equal to Mincey Marble model #TS-VN/6 x 24.

2) Provide associated sized Bull Nose "Tile-Like" Cap.

b. Provide required ceramic soap dishes, in same color as wall panels.

1) Provide soap dishes in locations, configurations, and sizes as shown on Drawings.

2.02 INSTALLATION MATERIALS

A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

B. Adhesive and Sealant (Installer to verify products are approved by Cast polymer materials Manufacturer):

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. "OSI SF400"; OSI Sealants, Inc. (800-999-8920)

b. "PL Premium 'Polyurethane' Adhesive"; OSI Sealants, Inc. (800-999-8920)

c. "LN-602 Liquid Nails", Liquid Nails, Macco Division of ICI Paints, (800-634-0015)

d. "DAP 2000", DAP, Inc. (888-327-8477)

e. Or as recommended by cast polymer manufacturer.

2.03 FABRICATION

A. General:

1. Shop assemble cast polymer materials for delivery to site in units easily handled and to permit passage through building openings.

2. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.

a. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

3. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trip for scribing and site cutting.

4. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings.

5. Provide for mounting of soap dishes, grab rails, etc., as indicated on the Drawings.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify adequacy of backing and support framing.

3.02 PREPARATION

A. Condition cast polymer materials to average prevailing humidity conditions in installation areas before installation.

3.03 INSTALLATION

A. All surrounds shall be installed as shown on Drawings and as specified by manufacturer.

B. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

C. Tub/Shower Surrounds:

1. Remove all dust and other contaminants from the back side of all panels before installation.

2. Secure soap dishes to panels with adhesive as recommended by Manufacturer.

3. Hold bottom edge of wall panel above rim of tub and shower for application of sealant as shown on Drawings.

3.04 ADJUSTING AND CLEANING

A. Keep components clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained and damaged components.

B. Protect surfaces from damage until Date of Substantial Completion. Repair work or replace damaged work which cannot be repaired to Owner's Representative's satisfaction.

END OF SECTION

Revision Log

SECTION 06 64 00 - PLASTIC PANELING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Decorative Acrylic Resin Panels.

B. Related Sections:

1. Section 06 82 00 Glass-fiber reinforced plastic (FRP): For (FRP) wall paneling and trim accessories.

2. Section 06 40 00 Architectural Woodwork for wood trim frames for decorative plastic paneling.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For low–emitting adhesives, including printed statement of VOC content.
2. Product Data for Credit IEQ 4.4: For low–emitting composite materials, including printed statement of VOC content and chemical components.
3. Product Data for Credit MR 4.1 and MR 4.2: For recycled content, including printed certification of percentage of recycled content.
4. Product Data for Credit MR 5: For Regional Materials. A minimum of 20 % of the construction materials to be manufactured within 500 miles of project site.

B. Samples for Initial Selection: For plastic paneling and trim accessories.

C. Samples for Verification: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class “A”, 25 or less.

2. Smoke-Developed Index: 450 or less.

3. Testing Agency: Acceptable to authorities having jurisdiction.

1.04 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 PRODUCTS

2.01 DECORATIVE ACRYLIC RESIN PANELS:

A. General Engineered polyester resin, glycol modified panels.

B. Manufacturers:

1. Avendra, LLC Preferred Manufacturers:
    a. None
2. Approved Manufacturers:
    a. 3Form, Inc. (800-726-0126)
    b. Lumicor (888-586-4267)
    c. Light Blocks (603-889-1115)
    d. Veritas (877-411-8008)
    e. DesignTex, A Steelcase Company (202-638-6006)

C. Material:
1. Sheet Size: As indicated on Drawings
2. Nominal Thickness: As indicated on Drawings and Interior Finish Index
3. Interlayer: As indicated on Drawings and Interior Finish Index
4. Surface Finish: As indicated on Interior Finish Index
5. Color and Pattern: As indicated on Interior Finish Index
6. Flame-Spread Index: Class “B”, 75 or less
7. Smoke-Developed Index: 450 or less

D. Accessories
1. Trim Accessories:
    a. Manufacturer's standard aluminum extrusions designed to retain and cover edges of panels or approved substitution by listed manufacturer:
        1) Color and Finish: As shown in Interior Finish Index or on Drawings.
2. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF DECORATIVE ACRYLIC RESIN PANELS

A. Provide panels in sizes and locations as indicated on drawings. Install units plumb, level and true. Secure rigidly in place in accordance with manufacturer’s instructions.

B. Securely mount panels in accordance with manufacturer's instructions, with concealed fasteners.

3.03 CLEANING

A. At completion of work, clean surfaces and trim, leaving ready for use.

B. Verify that all trim and accessories are installed as required for each unit.

END OF SECTION

Revision Log

SECTION 06 82 00 - GLASS-FIBER-REINFORCED PLASTIC

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fiber reinforced plastic (FRP) panels
2. Accessories
3. Adhesives
4. Sealants for use with FRP Panels

B. Related Sections:

1. Section 07 92 00 – Joint Sealants
2. Section 09 21 16 - Gypsum Board Assemblies.

1.02 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Shop Drawings:
   a. Show locations and panel layouts; materials and finishes; panel size, thickness and color.
   b. Trim locations and types.
   c. Anchorage type and spacing.
   d. Installation methods; joint treatments; relationships with adjacent construction; and other pertinent information.
2. Samples: Each product specified.

1.03 QUALITY ASSURANCE

A. Reference Standards: Applicable requirements of standards and specifications referenced herein apply to the Work of this Section.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to job site in unopened containers bearing manufacturer's name and content identification.

B. Store materials as recommended by the manufacturer.

1.05 PROJECT CONDITIONS

A. Coordination: Coordinate this Work with the Work of other Sections to avoid any delay or interference with other Work.

B. Environmental Requirements: Acclimatize panels 48 to 72 hours prior to installation.

PART 2 PRODUCTS

2.01 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. “Marlite FRP”; Marlite (330-343-6621)
2. “Kemlite Glasbord FSI”; Crane Composites, Inc. A Crane Co. Company (800-435-0080)

2.02 MATERIALS

A. Fiberglass Reinforced Polyester Panels:

1. Flat with embossed pebble surface texture; moisture resistant and impervious to mold and mildew, conforming to Fedspec L-P-505 and PS53.
2. USDA approved.
3. Meet FDA requirements.
4. Surface Burning Characteristics: ASTM E84, Class C/III. (for typical applications.)
   a. Flame Spread: 100 or less.
   b. Fuel Contributed: 100 or less.
   c. Smoke Developed: 100 or less.
5. Surface Burning Characteristics: ASTM E84, Class A/I. (for exit corridors, passageways and vertical stair enclosures.)
   a. Flame Spread: 25 or less.
   b. Fuel Contributed: 100 or less.
   c. Smoke Developed: 100 or less.
6. Size: 0.090" (3/32) thick x 4' x 8'.
7. Color: As shown on Interior Finish Index.

2.03 ACCESSORIES

A. Moldings:

1. PVC trim moldings by panel manufacturer.
2. Include inside and outside corners, end caps, cap edging, and division bars.
3. Color to match panels.

B. Anchors

1. Manufacturer's standard nylon drive rivets suitable for anchoring to substrate shown on Drawings.

2.04 ADHESIVE

A. Type recommended by panel manufacturer.

2.05 SEALANT

A. Clear silicone sanitary sealant type recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas in which work is to be performed. Report in writing to General Contractor all prevailing conditions that will adversely affect satisfactory execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Starting work constitutes acceptance of the existing conditions.

3.02 PREPARATION

A. Surface preparation:

1. Surface to which panels are to be applied must be smooth, solid.

2. Clean surface of dirt, dust, grease or other matter which might interfere with adhesive bonding of panels to substrate.

B. Pre-Sizing:

1. Prefit each panel before installing.

2. Cut as required to closely and neatly fit obstructions, nonstandard panel spacing, and penetrations.

3. Maintain 1/8" around pipes, electrical fittings, obstructions, and other items penetrating panels, to allow for expansion.

3.03 INSTALLATION

A. Install panels and moldings in accordance with manufacturer's written instructions.

1. Adhesive Application:

a. Apply adhesive over entire back surface of panel using 3/16" V notched trowel.

b. Adhesive coverage: 60 sq. ft. per gallon, or;

2. Cohesive Method:

a. Skim coat adhesive on panel back and substrate.

b. Fan panel to verify bonding to substrate and adhesive curing time after installation.

B. Install panels with edges vertical and plumb. Use maximum length pieces for minimum number of end joints.

C. Predrill panel fastener holes slightly oversize to accommodate panel expansion to contraction.

D. Secure upper and lower panel ends with nylon drive rivets, or with other non-corroding mechanical fasteners recommended by panel manufacturer.

1. Space fasteners at 16" o.c.

2. Drive fasteners to snug fit, but do not over tighten.

E. Install and seal trim concurrently with panel installation.

F. Remove excess sealant during installation, or carefully trim off excess after sealant has cured.

G. Seal joints and seams between panels or moldings and floor or base, ceiling, walls and penetrations.

3.04 CLEANING

A. Remove labels, stains, and excess sealant.

B. Clean panels using materials and methods recommended by manufacturer.

END OF SECTION

Revision Log

SECTION 07 10 00 - DAMPPROOFING AND WATERPROOFING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sheet Membrane Waterproofing
2. Under-Slab-On-Grade Vapor Retarder (Refer to section 13 11 00.02- Swimming Pools-Indoor for Pool Area Vapor Retarder products and installation requirements.)

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 04 20 00 - Unit Masonry
3. Section 07 20 00 – Thermal Protection

1.02 SYSTEM DESCRIPTION

A. General: Provide waterproofing that prevents the passage of liquid water under hydrostatic pressure and complies with requirements as demonstrated by testing performed by an independent testing agency of manufacturer's current sheet membrane.

B. Provide waterproofing for locations and types specified regardless whether or not scheduled or shown on Drawings.

C. Exterior Waterproofing: Provide for the following conditions and of types indicated:

1. Concealed: Semi-liquid or sheet membrane. Provide for the following:
   a. Vertical Surfaces: All vertical walls below grade where adjacent floor slab is also below grade.
      (1) Pits: Elevator, sumps.
      (2) All horizontal slabs below grade; install on mudslab; tie into vertical waterproofing.
   b. All other exterior applications normally required by waterproofing to prevent entrance of water into building.

1.03 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Include product data on each type of dampproofing and waterproofing product specified, including data substantiating that materials comply with specified requirements.
   a. Mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this project.

B. Samples, 3 x 6 inches minimum size, of each fluid-applied and sheet membrane waterproofing material specified for Project.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed fluid-applied and sheet membrane waterproofing applications similar in material, design, and extent to that indicated for Project and that has resulted in construction with a record of successful in-service performance.

1. Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashings used in conjunction with waterproofing,

expansion joints in membrane, insulation, and protection course on membrane, to Installer of fluid-applied waterproofing, for single, undivided responsibility.

B. Single-Source Responsibility: Obtain primary waterproofing materials of each type required from a single manufacturer.

C. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer'' name, product, date of manufacturer, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer. Protect stored materials from direct sunlight.

1.06 PROJECT CONDITIONS

A. Environmental Conditions: Apply waterproofing within range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during penetration and application of waterproofing materials.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. General Compatibility: Provide products that are recommended by manufacturer to be fully compatible with indicated substrates.

2.02 SHEET MEMBRANE WATERPROOFING

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. “Bituthene 4000”; Grace Construction Products (800-444-6459)

2. "CCW MiraDRI 860/861"; Carlisle Coatings and Waterproofing Inc. (800-527-7092)

3. “650 Waterproofing Membrane”; Polyguard Products Inc. (800-541-4994)

2.03 FLUID-APPLIED WATERPROOFING

A. Materials:

1. Fluid Applied Waterproof Membrane: Spray applied, 0.60 mil thick, one component, elastomeric compound. ASTM C836

2. Cured Membrane Characteristics:

Properties	Test	Results	
Tensile Strength	ASTM D412	340 psi	
Elongation		ASTM D412	1100%
Hardness – Shore A		ASTM D2240	passes
Moisture Vapor (perms)		ASTM E96	.03 perms.

Adhesion	ASTM D429	Exceeds.

B. Approved Manufacturers:

1. “Procor 75”; Grace Construction Products (800-444-6459)
2. "Barricoat-S"; Carlisle Coatings and Waterproofing Inc. (800-527-7092)
3. Approved Substitution

2.04 UNDER-SLAB-ON-GRADE VAPOR RETARDER:

A. Vapor Retarder Under-Slabs-On-Grade:

1. Plastic Vapor Retarder: ASTM E1745, Class C, with maximum performance rating of 0.04 perm. Provide in lengths and widths required for least number of seams.
   a. Under Slab: 10 mils thick.
2. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.
3. Manufacturers:
   a. “Stego Wrap (10 mil) Vapor Barrier”; Stego Industries, LLC (877-464-7834)
   b. "Vapor-Mat (10 mil) Underslab Vapor Retarder"; W.R. Meadows, Inc. (800-342-5976)
   c. “Moistop Plus”; Fortifiber Corporation (800-773-4777)

2.05 MISCELLANEOUS MATERIALS

A. In addition to primary waterproofing materials, provide the following:

1. Primer/Filler/Sealer: As recommended by waterproofing manufacturer.
2. Flashings, Cant Strips, and Accessories: As recommended by waterproofing manufacturer.
3. Protection Course: Board as approved by system manufacturer, premolded, 1/8 inch (3 mm) thick, semirigid board consisting of mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt, surface-coated with asphalt and sealed to core under heat and pressure, and provided with polyethylene film facings.
   a. Avendra, LLC Preferred Manufacturers:
      1) None
   b. Approved Manufacturers:
      1) "Ram-Tough Protection Board"; The Barrett Co. (800-647-0100)
      2) "PC-2 Protection Course"; W.R. Meadows, Inc. (800-342-5976)
      3) "Protection Sheet"; Pecora Corp. (800-523-6688)
      4) "Protection Course II"; Sonneborn Division, ChemRex, a Degussa Construction Chemicals Americas Company (800-243-6739)
      5) "Tremboard"; Tremco, Inc. (800-562-2728)

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions under which waterproofing systems will be applied, with Installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. Do not proceed with installation until after minimum concrete curing period recommended by waterproofing manufacturer.

2. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

B. Inspect concrete and concrete masonry surfaces for:

1. Contamination: Algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, mildew or other foreign substances.

2. Surface absorption and chalkiness.

3. Cracks: Measure crack width and record location of cracks.

4. Damage and deterioration.

5. Moisture content and moisture damage:

a. Use a moisture meter to determine if the surface is dry enough to receive the air and moisture barrier and record any areas of moisture damage or excess moisture.

6. Compliance with specification tolerances:

a. Record areas that are out of tolerance (greater than 1/4 inch in 8-0 feet deviation in plane).

C. Notify Owner’s Representative in writing of anticipated problems using waterproofing over substrate.

3.02 PREPARATION

A. Clean substrate of projections and substances detrimental to work; comply with instructions of prime materials manufacturer.

B. Install cant strips and similar accessories as shown and as recommended by prime materials manufacturer even though not shown.

C. Fill voids, seal joints, and apply bond breakers as recommended by prime materials manufacturer.

D. Prime substrate as recommended by prime materials manufacturer.

3.03 INSTALLATION - GENERAL

A. Comply with manufacturer's written installation recommendations, including preparation of substrate surfaces, detail coatings of joints and planar changes in substrate, and priming of substrates.

B. Mix separately packaged components in accordance with manufacturer's written recommendations.

3.04 INSTALLATION - SHEET MEMBRANE WATERPROOFING

A. Apply waterproofing membrane material to substrates and adjoining surfaces indicated to receive membrane. Apply in accordance with manufacturer's recommendations to obtain thicknesses specified and using applicators and techniques best suited for slope and type of substrate to which applied.

1. If two-coat application is required to obtain membrane thickness specified below, apply second coat only after initial coat has cured as recommended by manufacturer.

2. Provide 60 mil (average) membrane thickness, with minimum 50 mil thickness.

B. Install sheet membrane waterproofing material to substrates and adjoining surfaces indicated to receive membrane. Install in accordance with manufacturer's recommendations using applicators and techniques best suited for type of substrate to which applied.

C. Install sheet-type flashings and joint covers where indicated and as recommended by prime materials manufacturer. Extend flashings onto perpendicular surfaces and other work penetrating substrate to not less than 6 inches beyond finished surface to be applied over waterproofing.

D. Permit membrane to cure under conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.

E. Install protection course on cured membrane (after testing, if required) without delay to minimize period of membrane exposure.

1. On vertical surfaces comply with waterproofing manufacturer's recommendations for adhesion of protection course to membrane.

2. In-Place Testing: Before completed membranes on horizontal surfaces are covered by protection course or other work, test for leaks with 2 inch depth of water maintained for 24 hours. Repair any leaks revealed by examination of substructure, and repeat test until no leakage is observed.

F. Provide separation between waterproofing membrane and non-compatible substrates and materials in accordance with manufacturers published instructions.

3.05 INSTALLATION – FLUID APPLIED MEMBRANE WATERPROOFING

A. Membrane and Joint Cover Strips:

1. Joint Cover Strips: Prior to applying the spray applied membrane, cover all cracks with 12 inch wide strip of joint cover sheet, centered over crack. Cover all non-working joints over 1/16 inch. Embed strip into 1/8 inch bed of coating material and apply second coat extending 6 inch both sides of cover strip.

2. Spray-apply material at manufacturers recommended rate per square foot to produce uniform coating thickness.

B. Apply to all below grade surfaces to prevent water penetration into building.

C. Apply a double thickness of waterproofing material at all pipe penetrations, construction joints, corners, and footing to wall junction points.

D. Permit membrane to cure under conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.

E. Install protection course on cured membrane (after testing, if required) without delay to minimize period of membrane exposure.

1. On vertical surfaces comply with waterproofing manufacturer's recommendations for adhesion of protection course to membrane.

2. In-Place Testing: Before completed membranes on horizontal surfaces are covered by protection course or other work, test for leaks with 2 inch depth of water maintained for 24 hours. Repair any leaks revealed by examination of substructure, and repeat test until no leakage is observed.

F. Provide separation between waterproofing membrane and non-compatible substrates and materials in accordance with manufacturers published instructions.

3.06 INSTALLATION - UNDER-SLAB-ON-GRADE VAPOR RETARDER

A. General: Extend vapor and moisture barriers to extremities of areas to be protected from vapor transmission. Extend vapor and moisture barriers to cover miscellaneous voids in insulated substrates, including those which have been stuffed with loose fiber-type insulation.

B. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape of type recommended by vapor retarder manufacturer to create an air-tight seal between penetrating objects and vapor retarder.

C. Repair any tears or punctures in vapor and moisture barriers immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

D. Refer to Section 07 20 00 for installation of Under-slab-on-grade insulation.

3.07 PROTECTING AND CLEANING

A. Protect waterproofing from damage and wear during application and remainder of construction period, according to manufacturer's written instructions.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

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SECTION 07 19 00 - WATER REPELLENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Water Repellent Coating Applied to All Exterior Exposed Masonry Unit Walls

B. Related Sections:

1. Section 04 20 00 - Masonry Units

1.02 REFERENCES

A. FS SS-W-110 - Water Repellent, Colorless, Silicone Resin Base.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit product data including detailed test results of materials applied to surfaces similar to requirements of this Section.

2. Submit manufacturer's instructions for methods and application procedures.

3. Submit manufacturer's certification indicating water repellent coating conforms to or exceeds requirements stated herein.

1.04 QUALITY ASSURANCE

A. The Contractors involved with work covered by this Section shall have had a minimum of five years experience using specified techniques for water repellent application.

B. Tradesman must be competent and experienced and shall demonstrate reasonable care during performance of operations described in this Section.

C. Tests and Approvals:

1. Sample Area: Contractor shall apply a test area of wall surface from two to four square feet in size for inspection and approval by the Owner’s Representative. Samples of adjacent materials shall be tested for possible reaction with the water repellent. Such samples shall be available for inspection by the Owner’s Representative.

2. If any part of this work shall be found defective (because of improper preparation of surfaces or application of coating) at any time before the final acceptance of the item, the Contractor shall, at his own expense, make good such defect to the satisfaction of the Owner’s Representative.

1.05 PROJECT CONDITIONS

A. Protection:

1. Contractor shall provide, at all times, covered access to premises and necessary utilities, space for storage of material and equipment, etc.

2. All activities shall be in compliance with local and governmental regulations and codes.

3. The surface and atmospheric temperature should be at least 40 degrees F. and rising during application. Surfaces should be dry. Apply only in well ventilated areas. All caulking (sealants) should be applied a minimum of 24 hours prior to application, or as

required by sealant manufacturer, whichever is greater, before application of water repellent.

4. The Contractor shall require applicators to observe safety precautions as outlined on containers and labels. It is the responsibility of the Contractor to provide well ventilated areas for all workmen as well as to observe safety precautions as stipulated on labels and instructions of all materials used, and as required by governing authorities.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. “Hydrozo Enviroseal Double 7"; BASF Building Systems (800-433-9517)
2. "Sure Klean Weather Seal Siloxane WB"; ProSoCo, Inc. (800-255-4255)

PART 3 EXECUTION

3.01 PREPARATION

A. Verify surfaces to receive water repellent coatings are clean, free of efflorescence, oil, grease, or other foreign matter detrimental to application.

B. Remove loose particles and foreign matter. Remove grease or oil with a solvent, effective alkaline cleaner, or detergent as instructed by coating manufacturer. Scrub surfaces with water.

C. Allow surfaces to dry prior to application.

D. Protect all surrounding areas as recommended by the manufacturer or as directed by the Owner’s Representative.

1. Windows: Windows shall be protected from contact with materials by masking with polyethylene or other approved techniques.
2. All polished stone, metal, or non-masonry surfaces shall be protected from contact with the material by masking with polyethylene.
3. Masonry surfaces must be in good repair. All new construction or repointed surfaces must be allowed to cure for a minimum of 28 days prior to application. Surfaces must be completely dry.

3.02 APPLICATION

A. Test each surface and/or material to be treated to ensure compatibility and desired water repellency results. The surface to be treated must be clean and free of all foreign matter and as dry as possible to ensure penetration of the water repellent.

B. Apply material as supplied - do not dilute or alter material as packaged. Preferred method of application is with low pressure, airless diaphragm-type spray equipment or with a heavily saturated roller or brush. Apply in coverage rate as recommended by manufacturer for type of material.

C. Protect adjacent surfaces not scheduled to receive coating. If applied on unscheduled surfaces, remove immediately, by manufacturer approved method.

END OF SECTION

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SECTION 07 20 00 - THERMAL PROTECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Batt Insulation
2. Foundation Wall and Under Slab Insulation
3. Sound Attenuation Insulation
4. Acoustical Sound Barrier
5. Vapor Retarder (Refer to section 13 11 00.02- Swimming Pools- Indoor for Pool Area Vapor Retarder products and installation requirements.)
6. Air-Infiltration Barrier

B. Related Sections:

1. Section 04 20 00 - Unit Masonry
2. Section 05 40 00 - Cold-Formed Metal Framing
3. Section 06 10 00 - Rough Carpentry
4. Section 06 20 00 - Finish Carpentry
5. Section 07 10 00 – Dampproofing and Waterproofing
6. Section 07 62 00 - Sheet Metal Flashing and Trim
7. Section 07 84 00 - Firestopping
8. Section 09 21 16 - Gypsum Board Assemblies

1.02 REFERENCES

A. ASTM International Publications:

1. C578 "Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation"
2. C665 "Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing"
3. D4397 "Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications"
4. E84 "Standard Test Method for Surface Burning Characteristics of Building Materials"
5. E96 "Standard Test Methods for Water Vapor Transmission of Materials"
6. E119 "Standard Test Methods for Fire Tests of Building Construction and Materials"
7. E1677 "Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls"
8. E1745 "Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

B. Code of Federal Regulations (CFR) Publications:

1. 40 CFR 763, "Asbestos: Appendix A - Transmission Electron Microscopy Analytical Methods"

C. Underwriter's Laboratories, Inc. (UL) Standards

1. "Fire Resistance Directory"

1.03 DEFINITIONS

A. Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by r-values, they represent the rate of heat flow through a homogeneous material exactly 1" thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values (aged values for plastic insulations), densities, compression strengths, fire performance characteristics, perm ratings, water absorption ratings and similar properties.

1.05 QUALITY ASSURANCE

A. Fire Test Response Characteristics: Provide insulation materials which are identical to those whose fire-test-response characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface Burning Characteristics: ASTM E84

2. Fire Resistance Ratings: ASTM E119

3. Combustion Characteristics: ASTM E136

B. Asbestos Content of Inorganic Insulations: provide insulations composed of mineral fibers or mineral ores which contain no asbestos of any type of mixture of types occurring naturally as impurities as determined by polarized light microscopy test per Appendix A of 40 CFR 763.

C. All insulation in roof and wall assemblies shall be approved for use without an additional thermal barrier in accordance with Local Building Codes.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver insulation in original labeled bundles.

B. General Protection: Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

C. Protection for Plastic Insulation:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of work.

1.07 PROJECT CONDITIONS

A. The Installer must examine the substrate and the conditions under which insulation work is to be performed and notify the Architect in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

B. Weather Conditions: Proceed with work only when weather conditions are in compliance with manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with requirements and the manufacturer's recommendations.

C. Do not apply insulation to damp, frozen, dirty, dusty, or surfaces unacceptable to manufacturer.

D. Coordinate this work with all trades and protect it after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Unfaced Glass Fiber Batt Insulation

1. Avendra, LLC Preferred Manufacturers:
    a. None
2. Approved Manufacturers:
    a. Owens-Corning (800-438-7465)
    b. Johns-Manville (800-654-3103)
    c. CertainTeed Corp (800-223-8990)
    d. Approved Substitution

B. Faced Glass Fiber Blanket Insulation:

1. Avendra, LLC Preferred Manufacturers:
    a. None
2. Approved Manufacturers:
    a. Owens-Corning (800-438-7465)
    b. Johns-Manville (800-654-3103)
    c. CertainTeed Corp. (800-223-8990)
    d. Approved Substitution

C. Mineral Fiber Sound-Attenuation Insulation:

1. Avendra, LLC Preferred Manufacturers:
    a. None
2. Approved Manufacturers:
    a. "Thermafiber SAFB"; Thermafiber (888-834-2371)

D. Extruded Polystyrene Foam Board Insulation - Foundation Walls and Under Slab.

1. Avendra, LLC Preferred Manufacturers:
    a. None
2. Approved Manufacturers:

a. "Styrofoam Square Edge"; Dow Chemical Company (800-441-4369)

b. "Foamular 250"; Owens-Corning (800-438-7465)

E. Air-Infiltration Barriers:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. “Tyvek StuccoWrap”; DuPont Company (800-448-9835)

2.02 INSULATING MATERIALS

A. General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.

B. Extruded Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C578 for Type indicated; with 5-year aged r-values of 5.4 and 5 at 40 and 75 deg. F., respectively; and as follows:

1. Type IV, 1.6 lb./cu. ft. min. density, unless otherwise indicated.

C. Unfaced Glass Fiber Batt Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

D. Faced Mineral-Fiber Blanket Insulation: ASTM C665, Type Type II, Class C, Category 1; consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

1. Mineral-Fiber Type: Fibers manufactured from glass.

2. Flanged Units: Provide blankets fabricated with facing incorporating 5-inch - wide flanges along edges for attachment to framing members, or Polyethelene Wrapped Batts with stapling flaps.

E. Mineral Fiber Sound-Attenuation Insulation: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C665 for Type I (blankets without membrane facing), passing ASTM E136 for combustion characteristics.

1. Mineral-Fiber Type: Slag Wool-Fiber/Rock-Wool-Fiber.

F. Vapor Retarders:

1. Walls and Ceilings:

a. Polyethylene Vapor Retarder: ASTM D4397, with maximum performance rating of 0.12 perm provide in lengths required for least number of seams.

1) Walls: 6 mils thick

b. Where required by local codes or ordinances, provide fire-retardent, reinforced-polyethylene vapor retarders. Flame spread and smoke developed indicates of not more than 5 and 75, respectively.

c. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

d. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

G. Air-Infiltration Barrier

1. Air retarder complying with ASTM E1677; made from polyolefins; either cross-laminated films, woven strands, or spunbonded fibers; coated or uncoated; with or without perforations to transmit water vapor but not liquid water; and as follows:
   a. Minimum Thickness: 3 mils.
   b. Minimum Water-Vapor Transmission: 10 perms when tested according to ASTM E96, Procedure A.
   c. Maximum Flame Spread: 25 per ASTM E84.
   d. Minimum Allowable Exposure Time: 3 months.
   e. Membrane shall be free from holes and breaks other than those created by fasteners and construction system due to attachment.
2. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building wrap manufacturer for sealing joints and penetrations in building wrap.
3. Fasteners:
   a. Recommended Fasteners for Wood Framed construction:
      1) Nails with large Heads or plastic washers.
   b. Recommended Fastening to Masonry:
      1) Polyurethane or elastomeric adhesives

H. Accessories:

1. Nails and Staples: Steel wire, galvanized, type and size to suit application.
2. Tape: Polyethylene or Polyester, self-adhering type, 2 inches wide.
3. Insulation Fasteners: Steel impale spindle and clip on flat metal base, self adhering backing, length to suit insulation thickness, capable of securely and rigidly fastening insulation in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified. Obtain Installer's written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

1. Verify adjacent materials are dry and ready to receive insulation.
2. Verify mechanical and electrical services within insulated spaces have been installed and tested.
3. Verify substrate surface is flat, free of honeycomb, fins, irregularities, and materials that will impede adhesive bond.

3.02 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections which might puncture vapor retarders.

3.03 INSTALLATION, GENERAL

A. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specified recommendations before proceeding with work.

1. Verify insulation boards are unbroken and free of damage.

B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

D. Trim insulation neatly to fit spaces. Use boards free of damage.

E. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

F. Install all insulation in accordance with manufacturer's specifications.

G. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

3.04 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.

B. Protect top surface of horizontal insulation (from damage during concrete work) by application of protection board.

3.05 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Set vapor retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure air-tight installation.

C. Install glass fiber blankets in cavities formed by framing members according to the following requirements.

1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.

2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3.06 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those which have been stuffed with loose fiber-type insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners 16" o.c.

C. Seal overlapping joints in vapor retarders with adhesives per vapor retarder manufacturer's printed directions. Seal butt joints and fastener penetrations with tape of type recommended by vapor retarder manufacturer. Locate all joints over framing members or other solid substrates. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape of type recommended by vapor retarder manufacturer to create an air-tight seal between penetrating objects and vapor retarder.

E. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.07 AIR-INFILTRATION BARRIER

A. Cover sheathing with air-infiltration barrier as follows:

1. Apply air-infiltration barrier to comply with air-infiltration barrier manufacturer's written instructions and as coordinated with siding manufacturer's recommendations.

B. Install Air Infiltration Barrier over exterior side of exteriror wall sheathing.

1. Install Air Infiltration Barrier after sheathing is installed and before windows and doors are installed. Install lower level barrier prior to upper layers to ensure proper shingling of layers.

2. Overlap Air Infiltration Barrier at corners of building by a minimum of 12 inches.

3. Overlap Air Infiltration Barrier vertical seams by a minimum of 6 inches.

4. Ensure barrier is plum and level with foundation, and unroll extending Air Infiltration Barrier over window and door openings.

5. Attach Air Barrier to wood, or exterior gypsum with plastic cap nails every 12” to 18” on vertical stud line with wood stud framing, and screws with washers to metal stud.

C. Refer to Section 07 62 00 for flashings at Wall Openings such as windows and doors; and areas indicated on drawings for use of Ice and Water Shield.

D. Tape all horizontal and vertical seams of Air Infiltration Barrier.

E. Tape a patch over all tears and cuts in Air Infiltration Barrier.

3.08 PROTECTION

A. General: Protect installed insulation and vapor retarders from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

PART 4 SCHEDULES

4.01 SCHEDULES

A. Attic Insulation: R=38, kraft-faced insulation.

B. Exterior Wall and Soffit Insulation: R=21, unfaced, batt fiberglass insulation. Completely fill void to thickness of wall and soffit framing to STC requirements required.

C. Acoustic Insulation in Interior Walls and where indicated on the drawings: Unfaced, Mineral Fiber Sound-Attenuation, batt insulation friction fit, completely fill void to thickness of wall to STC requirements required.

D. Acoustic Insulation in Floor/Ceiling assemblies: Faced or Unfaced batt fiberglass insulation to meet STC-50.

E. Rigid Board Insulation in Foundation Perimeter: R=10.

END OF SECTION

Revision Log

SECTION 07 24 19 - WATER DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 GENERAL

1.05 SUMMARY

A. Section Includes:

1. Water Management Exterior Insulation and Finish Coating Systems Application with secondary air/moisture barrier system as described and specified herein. Provide direct board applied compatible exterior finish system at all exterior soffits and overhangs.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 07 20 00 - Thermal Protection
3. Section 07 62 00 - Sheet Metal Flashing and Trim
4. Section 07 92 00 – Joint Sealants
5. Section 09 96 00 – High Performance Coatings

1.06 REFERENCES

A. ASTM International Publications:

1. B117 "Standard Practice for Operating Salt Spray (Fog) Apparatus"
2. C150 “Standard Specification for Portland Cement“
3. C1063 “Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster”
4. C1177/C1177M “Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing”
5. C1397 “Standard Practice for Application of Class PB Exterior Insulation and Finish Systems”
6. C1481 “Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS)"
7. D1784 “Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds”
8. D4258 "Standard Practice for Surface Cleaning Concrete for Coating"
9. D4261“Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating”
10. E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials"
11. E331 “Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference”
12. E2098 “Standard Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish Systems (EIFS), after Exposure to a Sodium Hydroxide Solution”
13. E2110 “Standard Terminology for Exterior Insulation and Finish Systems (EIFS)”
14. E2273 “Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies”

B. EIFS Industry Members Association (EIMA) Publications.

1. EIMA “Test Method 101.01 Freeze/Thaw”
2. EIMA “Test Method 101.02 Water Penetration”
3. EIMA “EPS Insulation Board Specification”
4. EIMA Guide to EIFS Construction

C. Gypsum Association (GA) Publications:

1. GA-253 "Recommended Specifications for the Application of Gypsum Sheathing"

D. International Code Council (ICC)

1.07 DEFINITIONS

A. Class PB Exterior Insulation and Finish System (EIFS), per ASTM E2110 are systems applied over insulation board, in which the base coat ranges from not less than 1 /16 in. (1.6 mm) to 1/4 in. (6.4 mm) in dry thickness, depending upon the number of nonmetallic reinforcing mesh layers encapsulated in the base coat. The base coat is then covered with a finish coat of various thickness in a variety of textures and colors.

1.08 SYSTEM DESCRIPTION

A. Design Requirements:

1. Polymer-based protective coating 100% pure acrylic resin based materials. No materials using non-acrylic resins in their formulas will be accepted.
2. Exterior insulation and finish system refers to a non-structural exterior wall assembly composed of the following components:
   a. An approved substrate
   b. An approved air/moisture barrier compatible with substrate and with adhesively attached insulation system.
   c. UV treated PVC perforated Drainage track
   d. Thermal insulation board adhesively attached to the substrate
   e. Polyethylene, self-adhering flashing tape compatible with substrate coatings.
   f. A reinforced base coat applied to the insulation board
   g. A 100% acrylic based textured coating applied over the reinforced base coat.
   h. Approved sealants are required at all dissimilar materials as well as EIFS to EIFS expansion and control joints, and are specified in Section 07 92 00.

B. Performance Requirements:

1. General: Provide systems that comply with the following performance requirements:
   a. Bond Integrity: Free from bond failure within system components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
   b. Weathertightness: Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of system and assemblies behind it, including substrates, supporting wall construction, and interior finish.
   c. Water Penetration: No water penetration when tested in accordance with ASTM E331 and EIMA 101.02.

d. Moisture Resistance: No deleterious effects after 14 days when tested in accordance with ASTM D 2247.

e. Drainage: Greater than 90% drainage efficiency when tested in accordance with ASTM E2273.

f. Salt Spray Resistance: No deleterious effects after 300 hours when tested in accordance with ASTM B117.

g. Freeze/Thaw: No deleterious effects when tested in accordance with EIMA 101.01.

h. Mildew Resistance: No growth supported during 28 day exposure period when tested in accordance with ASTM D3273.

2. Impact Resistance:

a. EIMA 101.86 minimum valves without cracking:

1) EIMA Impact Classification Level 2 - Adhesive/Base Coat – 50-89 in/lb

2) EIMA Impact Classification Level 3 – Adhesive/Base Coat – 90-150 in/lb

3) EIMA Impact Classification Level 4 - Adhesive/Base Coat – >150 in/lb

b. From grade to 2nd floor, a minimum 90-150 inch/pounds impact system is required.

c. From 2nd floor up to a minimum 50-89 in/lb impact system is required.

d. High traffic areas: provide 150 in/lb or greater impact system.

1.09 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Submit technical product data, test reports, installation instructions and recommendations from manufacturer, including data that materials comply with requirements.

2. Submit one 1 ft. x 1 ft. sample of the wall system for each finish, color, and texture selected using same tools and techniques as for the actual project.

3. Shop Drawings: Show fabrication and installation of system including plans, elevations, sections, details of components, joint locations and configurations within system and between system and construction penetrating it, termination details, and attachments to construction behind system which are project-specific..

4. Manufacturer's written certification of installer.

5. Certification that materials meet or exceed requirements.

B. LEED Submittals:

1. Product Data for Sustainable Sites Credit 7.1: Heat Island Effect - Non-Roof Light colored surfaces with a Solar Reflectance Index (SRI) value of at least 29 comply with this LEED requirement including printed statement of compliance.

2. Product Data for Credit EQ 4.1: For sealants and sealant primers used inside the weatherproof building envelope, including printed statement of VOC content.

3. Product Certificates for Credit MR 5.1: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.

a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.

b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

4. Refer to Division 07 “Joint Sealants” for Affidavit Form to be completed by sealant applicator and submitted with EIFS warranty.

C. Field-Constructed Mock-Up: Prior to installation of exterior insulation and finish systems, erect mock-ups for each form of wall construction, including typical caulked joints and/or rustication type joints, etc., and finish required to verity selections made under sample submittals. Build mock-ups to comply with the following requirements, using materials indicated for final work:

1. Locate mock-ups on site in location and of size indicated or, if not indicated, as directed by the Owner’s Representative.

2. Obtain the Owner’s Representative acceptance of mock-up’s visual qualities before start of final work.

D. Affidavits:

1. Where mandated by applicable building codes, provide affidavits from EIFS and sealant applicators confirming full compliance to all manufacturer's application requirements.

2. Refer to Marriott Exterior Insulation and Finish Affidavit at the end of this Section. This Contractor shall complete the document and submit it as an attachment to the EIFS warranty.

E. As part of Contract close-out, submit with warranty, copies of all "Field Inspection Reports" from EIFS manufacturing representative and a letter from the approved EIFS manufacturer confirming the following:

1. The EIFS as installed has been tested per Code requirements and does not affect the fire rating of the exterior wall assembly.

2. The EIFS application and installation has been inspected by manufacturer's representative and are confirmed to be in full compliance to the manufacturer's minimum application requirements.

3. The specific brand and type of sealants used on this project are compatible with the correctly installed in conjunction with the approved EIFS. Document to also list the approved sealant manufacturer.

1.10 QUALITY ASSURANCE

A. Qualifications:

1. The Applicator, Fabricator, and Insulation Board Manufacturer shall be approved by the manufacturer in writing on company letterhead. Attach this letter to warranty.

2. The manufacturer shall be a member of the Exterior Insulation Manufacturer's Association - EIMA.

3. The manufacturer shall have manufactured Exterior Insulation and Finish Systems in the United States for at least five years.

4. The installer shall have had a minimum of five years experience installing the specified product on projects similar in scope, and with a record of successful in-service performance.

B. Design and Detailing:

1. The Manufacturer's Applicator shall verify that the proposed Substrate is acceptable prior to the application of the System.

2. The System shall be installed in accordance with manufacturer's published details and specific recommendations for this project.

C. Approvals, Listings, and Classifications:

1. Fire-Test-Response Characteristics: Provide system assemblies and components with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting agency.

a. Insulation Board: Flame Spread Index of 25 or less and a Smoke Developed Index of 450 or less when tested individually per ASTM E84.

b. Finish Coats: Flame Spread Index of 20 or less and a Smoke Developed Index of 10 or less when tested individually per ASTM E84.

2. Code Approvals:

a. The EIFS system shall maintain a research report with the applicable building codes and agencies within the jurisdiction of the Project. Code compliance must be based on full scale diversified fire testing in its end use configuration by independent agencies whose classifications and requirements have general acceptance as regulator.

b. The EIFS system shall meet or exceed the Energy Standards as set by the applicable building codes and agencies within the jurisdiction of the project.

c. The System shall be evaluated, listed, and classified as described in the following documents:

1) ICC Research Report

2) Local Approval

D. Pre Installation meeting: The EIFS installer's foreman or superintendent for this project and a representative of the EIFS system manufacturer shall attend the Pre-installation meeting prior to the start of the EIFS application.

E. The performance of the EIFS shall be the sole responsibility of the EIFS manufacturer. The EIFS installer shall comply with the manufacturer's recommendations.

F. Inspections

1. Provide independent third party inspection where required by applicable building codes and agencies within the jurisdiction of the Project.

2. Conduct inspections in accordance with code requirements and contract documents.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened packages with manufacturer's labels intact and clearly identifying products.

B. Store materials inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1. Protect coatings delivered in pails from freezing and temperatures in excess of 90°F. Store away from direct sunlight.

2. Protect bagged Portland cement based materials from moisture and humidity. Store under cover and off the ground in a dry location.

3. Stack insulation board flat and off the ground.

4. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.

5. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.12 PROJECT CONDITIONS

A. Environmental Limitations: Do not install system when ambient outdoor air and substrate temperatures are 40 deg F and falling unless temporary protection and heat are provided to maintain ambient temperatures above 40 deg F during installation of wet materials and until they have dried thoroughly and become weather resistant, but for at least 24 hours after installation of Air/Moisture barrier and EIFS.

B. Adjacent materials and the wall system shall be protected during installation, while curing and/or unattended, from weather and other damaging conditions.

1.13 COORDINATION

A. The work of this Section shall be coordinated with the work specified in related Sections.

B. Provide site grading such that the EIFS terminates above finished grade a minimum of 8 inches or as required by governing code.

C. Coordinate installation of foundation waterproofing, roofing membranes, windows, doors and other wall penetrations to provide a continuous air/moisture barrier.

D. Coordinate location of system terminations at adjoining materials and around penetrations to provide a minimum joint size as required by the system manufacturer for application of sealant but no less than ½ inches.

E. Provide protection of rough openings through walls per IBC requirements prior to installation of windows, doors and other items which penetrate the exterior walls.

F. Coordinate installation of windows and doors so air/moisture barrier components are installed per manufacturer's recommendations and details.

G. Install window and door head flashing immediately after windows and doors are installed.

H. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.

I. Install copings and sealant immediately after installation of the EIFS and when EIFS coatings are dry.

J. Attach penetrations through EIFS to structural support and provide water tight seal at penetrations. Follow EIFS manufacturers recommendations on fastening through the System.

K. Temporary protection shall be provided during the wall system application and prior to the installation of the sealant and flashing systems at all locations that could allow moisture penetration. Do not allow water to penetrate behind EIFS.

L. All joints to be sealed shall be done immediately after completion of field applied wall system.

M. The tops of all walls must immediately be covered with either the final trim or temporary protection to prevent water infiltration behind the system. Coping shall be installed as soon as possible after the installation of the system.

1.14 MAINTENANCE

A. Maintenance Kit:

1. Supply maintenance kit and store at site where directed by Owner's Representative.

a. Containers of liquids shall be unopened.

2. Maintenance kit shall contain the following components:

a. Printed maintenance instructions

b. One gallon of adhesive

c. Minimum one gallon of finish color coating for each color used

d. 32 square feet of each type reinforcing fabric

e. 32 square feet of insulation board

1.15 WARRANTY

A. Manufacturer shall provide a 10-year limited warranty on the labor and materials associated with the EIFS and 10 year materials and labor moisture drainage warranty. This warranty is exclusive of flashings.

1. This warranty shall be assignable subject to the requirements as stipulated in the Marriott Quality Assurance Program.

2. This installer shall provide a 2-year warranty for all workmanship related to EIFS application.

B. Work is warrantied against:

1. Material defects, including, but not limited to, peeling, cracking, delamination, flaking, or similar failures.

2. Seepage and leakage of water or excessive moisture into the building or wall cavities through the system. EIFS to EIFS and EIFS to dissimilar sealer joints.

C. Inspection:

1. The manufacturer shall provide final inspection at the completion of application of the system including all contiguous sealant joints as per the submitted Marriott Quality Assurance Program.

PART 2 PRODUCTS

2.05 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. “StoTherm Essence NExT”; Sto Corp. (888-786-3437)

a. Refer to Section 09 96 00 – High Performance Coatings for use of “Sto Decocoat” system at interior of pool environment.

2. “Senerflex Channeled Adhesive Design” System; BASF Wall Systems, Inc. (800-221-9255).

3. "Outsulation Plus System"; Dryvit Systems, Inc. (401-822-1980)

2.06 GENERAL:

A. All components of the wall system shall be obtained from one manufacturer. No substitutions or addition of other materials will be allowed.

2.07 MATERIALS

A. Compatibility: Provide substrates, air/moisture barrier, adhesive, board insulation, reinforcing meshes, base- and finish-coat materials, sealants, and accessories that are compatible with one another and approved for use by system manufacturer for Project.

B. Air/Moisture Barrier: A ready mixed acrylic based, fiber reinforced, waterproof coating.

1. Install layer of air infiltration barrier to completely cover sheathing before installation of EIFS system.
2. Air/Moisture Barrier System Accessories: For use at substrate joints and at openings in the substrate and penetrations through the substrate.
    a. Joint Treatment: ready mixed acrylic based, flexible joint compound as recommended by the manufacturer for use the air/moisture barrier.
    b. Grid Tape: Open weave fiberglass mesh tape with pressure sensitive adhesive.
    c. Flashing Tape: Self-adhesive type as recommended by the manufacturer for use with the air/moisture barrier system.
    d. Flashing Tape Surface Conditioner: as recommended by manufacturer for use with system flashing tape.

C. Insulation Board:
1. Molded-Expanded-Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by expansion of polystyrene resin beads or granules in a closed mold. Comply with system manufacturer's requirements, ASTM C578 for Type I, and "EIMA EPS Insulation Board Specification" for more stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
    a. Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
        1) Nominal 1.0 pcf, of the thickness and shape as shown on the Drawings.
        2) Flamespread and smoke development shall be less than or equal to 25 and 450 respectively when tested by ASTM E84.
        3) Minimum thickness shall be as shown on Drawings and not less than 1”.
        4) Maximum thickness: Per building code requirements.
        5) Labeling and quality control shall comply with the building code.

D. Adhesive: Factory blended, polymer modified, cement based adhesive as recommended by the Manufacturer to be compatible with the substrate and insulation being utilized.

E. Reinforcing Mesh: Balanced, alkali-resistant, interlaced open-weave glass-fiber mesh treated for compatibility with other system materials, made from continuous multi-end strands with retained mesh tensile strength of not less than 120 lbf/in per EIMA 105.01, complying with ASTM D578 and the following requirements for minimum weight:
1. Standard weight, as recommended by manufacturer to meet EIMA Impact Classification Level 2, not less than 4.3 oz.
2. Intermediate weight, as recommended by manufacturer to meet EIMA Impact Classification Level 3, not less than 6 oz.
3. Heavy-duty impact resistant to meet EIMA Impact Classification Level 4 in locations as shown on Drawings, and as selected below, not less than 20 oz..

F. Base-Coat Materials: System manufacturer's standard mixture complying with, Type I, white or natural color, and compatible with system manufacturer’s standard polymer-based Adhesive.

G. Finish Coat: Materials System manufacturer’s standard mixture, complying with the following requirements for material composition and method of combining materials:
1. Factory mixed acrylic polymer emulsion texture finish with color fast mineral pigments forming integral finish color.

2. Color: Refer to Exterior Finish Index.

3. Texture: Refer to Exterior Finish Index.

H. Wall System:

1. Shall have been tested for the environmental tests specified in Paragraph 1.5 and the properties shall meet or exceed the listed values.

2. Shall have been tested by large scale diversified fire test, Modified ASTM E108 - Results - The wall system does not contribute to vertical or horizontal flame spread propagation nor produce large quantities of smoke.

I. Cement: Type I Portland Cement, ASTM C150.

J. Water:

1. Water shall be clean and potable. Water shall be tested by the installer for excessive levels of iron and all other potentially damaging substances prior to its incorporation in accordance with the manufacturer's published instructions.

K. Sheathing (Vertical and Horizontal Applications):

1. Type X Glass Mat Water-Resistant Gypsum Sheathing Board, per Section 06 10 00. Conform to ASTM C1177.

L. Air Infiltration Barrier:

1. Material: Refer to Section 07 20 00.

2. Install layer of specified air infiltration barrier to completely cover all sheathings before installation of EIFS system.

M. Mechanical Fasteners: System manufacturer's recommended corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board.

N. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with system manufacturer's written requirements, manufactured from vinyl plastic and complying with ASTM C1063.

1. Casing Bead: If required by specified system, provide prefabricated one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating.

2. Drainage/Starter Track: UV Treated PVC Perforated "J" channel with weep holes, complying with ASTM D1784 and ASTM C1063.

a. Drainage Strip: Corrugated plastic sheet material.

O. Elastomeric Sealant Products: Provide system manufacturer's listed and recommended chemically curing, elastomeric sealant that is in accordance with ASTM C1382 and compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in "ASTM C1481 Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS)" and with requirements in Section 07 92 00 "Joint Sealants" for products.

2.08 MIXING

A. General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by system manufacturer. Mix materials in clean containers. Use materials within time period specified by system manufacturer or discard.

PART 3 EXECUTION

3.05 EXAMINATION

A. Prior to application of the wall system, the substrate shall be examined by the installer for compliance with the Contract Documents and manufacturer's specifications. The Contractor and Owner's representative shall be advised of all discrepancies. All substrates shall be free of surface and excessive internal moisture. Work shall not proceed until unsatisfactory conditions are corrected.

1. Inspect sheathing application for compliance with GA-253.

3.06 PREPARATION

A. Protect contiguous work from moisture deterioration and soiling caused by application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

B. Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.

C. Prepare and clean substrates to comply with system manufacturer's written requirements to obtain optimum bond between substrate and adhesive for insulation.

1. Apply primer-sealer over substrates where required by system manufacturer for improving adhesion or for protecting substrates from degradation.

3.07 INSTALLATION

A. Comply with EIMA Guide to EIFS Construction and system manufacturer's written instructions for installation of system as applicable to each type of substrate indicated.

1. Avoid all sources of open flame in immediate are of application.

2. Under no circumstances shall accelerators, retarders, or other admixtures be used.

3. Use clean non-metal container, free of all foreign substance, for mixing and preparing material. Do not use container which has been used for or cleaned with a petroleum product.

B. Install Air Infiltration Barrier in accordance with EIFS manufacturer's instructions.

C. Attach insulation to substrates to comply with EIMA Guide to EIFS Construction, system manufacturer's written requirements, and the following:

1. Apply boards over dry substrates in courses.

2. Joints:

a. Stager vertical joints in successive courses to produce running bond pattern.

1) Offset joints of insulation from joining in sheathing.

b. EIFS to EIFS joints, vertical or horizontal: Install insulation board with a clear ¾" space prior to backwrap application. The finish joint shall be ½" clear space to receive sealant. Provide vertical expansion joints at a maximum 70'-0" within EIFS (keep substrate continuous).

c. EIFS to EIFS joints where building frame has expansion joints or underlying substrate will have localized movement.

1) Horizontal expansion joints at floor lines where localized shrinkage of solid wood floor framing members is anticipated.

2) Expansion joints within building structural frame: Same basic installation as an EIFS to EIFS joint above. The width of sealant join is a function of pre-determined expansion joint size. The finish joint width should be 4 times the anticipated joint movement.

d. EIFS to Dissimilar materials: (windows, doors, louvers, etc where anticipated movement of sealant joint is static. Installation board shall be installed with a clear 3/4" space prior to the backwrap application. Finish sealant joint width to be minimum 1/2" wide.

e. EIFS to Dissimilar materials (strip windows, or louvers etc. where the anticipated movement of sealant joint is dynamic). Similar condition to EIFS to EIFS where movement is anticipated. The width of sealant joint is a function of overall calculated movement of the step window or louvers. The finish joint width should be 4 times the anticipated joint movement.

3. Interlock ends at internal and external corners.

4. Rasp or sand flush any irregularities projecting more than 1/32" from surface of insulation; do not create depressions deeper than 1/16". Fill all gaps within insulation boards with EPS.

5. Cut insulation to fit openings, corners, and projections and to produce edges and shapes conforming to details indicated.

6. Sealants shall be applied to reinforced base coat only. Application to finish coat will not be acceptable.

7. Treat exposed edges of insulation board by encapsulating with base coat, reinforcing fabric, and finish coat.

8. Coordinate flashing installation with installation of insulation.

D. Apply base coat to exposed surfaces of insulation in thickness specified by EIMA and system manufacturer.

1. Minimum thickness of base coat to be 1/8 inch

2. Prior to application of base coat, remove yellow dust deposits resulting from excessive UV exposure.

E. Fully embed reinforcing fabric of weight indicated below in wet base coat to produce wrinkle free installation so that no mesh color or pattern is visible:

1. Fabric Weight: Standard, unless otherwise indicated. Minimum 4.3 oz. mesh.

2. Heavy-Duty Impact Resistant: From ground level to minimum 8'-0" high, at all corners of doors and windows, all column surrounds and in other locations as shown on Drawings. Minimum 20 oz. mesh.

3. Mesh to be continuous at corners and overlapped not less than 2-1/2". Do not lap reinforcing mesh within 8" of corners.

F. Apply finish coat over dry base coat in thickness required by system manufacturer to produce a uniform finish of texture and color matching approved sample.

3.08 MASONRY AND CONCRETE CEMENTITIOUS COATING

A. Remove surface contaminants per ASTM D4258 and D4261.

B. Repair surface defects including honeycombs, voids or pitted areas with approved patching material.

C. Repair surface cracks per manufacturers recommendations.

D. Apply surface conditioner to chalking or absorbent surfaces.

E. Skim coat entire surface with leveler material to fill all voids and make all mortar joints flush with the surface.

F. Inspect surface to ensure there will be no telegraphing of surface defects to finish coating.

G. Apply finish coating to primed surfaces in strict accordance with manufacturer’s specifications.

3.09 INSTALLATION OF JOINT SEALANTS

A. Prepare joints for sealants, of type and at locations indicated, to comply with applicable requirements in Section 07 92 00 “Joint Sealants" and in "EIMA Guide for Use of Sealants with Exterior Insulation and Finish Systems, Class PB."

1. Clean surfaces to receive sealants to comply with indicated requirements and system manufacturer's written instructions.

2. Joint sealants to be applied after base coat has cured but before applying finish coat.

3.10 CLEANING AND PROTECTING

A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive system coatings.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer and system manufacturer, that ensure system is without damage or deterioration at the time of Substantial Completion.

EXTERIOR INSULATION AND FINISH AFFIDAVIT
(ATTACH TO EIFS PROJECT WARRANTY)

EIFS Applicator Sub-Contractor: _____
(Type Name)

Completion Date: _____

THE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS) INSTALLED ON THE STRUCTURE LOCATED AT THE ADDRESS BELOW:

_____ **CONFORMS** _____ **DOES NOT CONFORM**

TO: _____
(EFIS Manufacturer)

RECOMMENDED INSTALLATION PRACTICES AND PROJECT MANUAL SECTION 07240 (07 24 00) (EIFS SPECIFICATION)

Name & Address of Structure

Product Component Names	
Adhesive(s):	
EPS Molder's Name:	
Fasteners (mechanical):	
Base Coat:	
Reinforcing Fabric:	
Finish Coat(s):	

Installation	**Conforms**	**Does Not Conform**
A. Substrate Type and Installation		
B. EIFS		
1) Adhesive and/or Fasteners		
2) Insulation		
3) Reinforcing Fabric		
4) Base Coat		
5) Finish		

C. The information entered above is offered in **testimony** that the **EIFS** installation conforms with the listed EIFS manufacturer's installation methods and procedures and all applicable model or jurisdictional building codes.

Note: *An affidavit shall be received from the sealant installer indicating that the sealant installation conforms with the EIFS minimum application requirements and sealant manufacturer's installation methods and procedures and must accompany this declaration. These affidavits must be attached to the EIFS project warranty for this project.*

EIFS Contractor Company Name & Address:

Signature of responsible officer: _____
Typed Name and Title of Officer: _____
Telephone Number: ( )

END OF SECTION

Revision Log

SECTION 07 41 13 - METAL ROOF PANELS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Metal roof panel system: Including factory finished metal panels; including anchorages, shims, furring, fasteners, gaskets and sealants; related flashing adapters, and masking (as required) for a complete installation.
2. Gutters and downspout with blocking and anchorage into EIFS wall system.
3. The following types of work are specified in this Section:
    a. Metal Roof Panel System
    b. Flashings
    c. Matching trim and fascia.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 07 24 19 - Water Drainage Exterior Insulation and Finish Systems
3. Section 07 62 00 - Sheet Metal Flashing and Trim
4. Section 07 92 00 - Joint Sealants.

1.02 SYSTEM DESCRIPTION

A. Metal roof system shall be grounded in accordance with local Codes, as approved by the Building Department. This Contractor shall provide a provision for connection of roof system grounding system to building ground system by Electrical Contractor. Coordinate with Electrical Contractor as required for complete grounding system.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Submit metal manufacturers and fabricator's specifications, installation instructions, and general recommendations for roof panel applications. Include certification or other data substantiating that materials comply with requirements.
2. Samples: Submit 8" square samples of specified metal to be used as roof panels with specified finishes applied.

B. Shop Drawings: Submit Shop Drawings showing manner of forming, joining, and securing metal panels, and pattern of seams. Show expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.

1.04 QUALITY ASSURANCE

A. Installer: A firm with five years of prior successful experience with installation of metal panel systems of type and scope equivalent to work of this Section. Installer shall be certified in writing by the manufacturer to be an authorized and franchised dealer of the system to be furnished. Certification shall state date on which authorization was granted.

B. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of "Architectural Sheet Metal Manual" by SMACNA. Conform to dimensions and profiles shown.

C. The intent of these Specifications is to establish a quality and performance level for structural design, material, durability, and workmanship.

D. All bidders must conform strictly to these Specifications in their Bid.

E. The metal panel manufacturer shall be United States based and demonstrate it has been in the business of furnishing (and/or erecting) complete building systems of similar size and complexity for a minimum of ten (10) years.

1. Building system manufacturer shall be American Institute of Steel Construction, Category MB Certified.

2. All materials shall be new, unused, free from defect.

F. The following criteria shall also be applicable in other phases of design:

1. Building Code having jurisdiction over the area in which the site is located.

2. ASTM Standards

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials other than framing and structural members shall be covered with weathertight coverings and kept dry. Storage accommodations for roof covering shall provide good air circulation and protection from surface staining.

1.06 WARRANTY

A. The following guarantees shall be provided by the metal panel system manufacturer:

1. Durability of the roof panels against rupture, structural failure, or perforation shall be guaranteed for a period of ten (10) years.

2. The color finish for the roof panels shall be guaranteed by the building manufacturer for standard term against blistering, peeling, cracking, flaking, checking, and chipping. Excessive color change and chalking shall be guaranteed for ten (10) years.

B. Provide manufacturer's written weathertightness warranty for a maximum of ten (10) years against leaks in roof panel system.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. “R Panel - WPRP”; Dimensional Metals Inc. (DMI) (800-828-1510)

2. "R” Panel System; Berridge Manufacturing Company (800-231-8127)

3. "Grand V Series"; ATAS International, Inc. (800-468-1441)

2.02 DESIGN LOADS

A. The basic design loads shall include wind (both external and internal), and earthquake (where applicable). All other foreign loads, whether they be of static, dynamic, or kinetic nature, shall be considered as auxiliary loads. Refer to Drawings for design loads.

2.03 ROOF PANELS

A. Basis-of-Design Product: Subject to compliance with requirements, provide "R Panel" preformed metal panels by Dimensional Metals Inc.

1. Model Number: WPRP

2. Seam Height and Centers: Based on model number above.

B. Panel clips: Manufacturer standard to meet specified performance criteria.

C. Flashing and trim: Same material and finish as the roof panels.

D. Fasteners:

1. Exposed screw fasteners shall be 300 series alloy stainless steel with integrally bonded neoprene washers or Zinc Aluminum Cast head covers with integral neoprene gaskets.

2. Exposed pop rivets shall be stainless steel, rivet and mandrel, self plugging type #44 - 1/8" diameter 1/4" grip range minimum. Exposed pop rivets shall be painted to match the metal panel system.

E. Closures: Factory fabricated from similar material to the roof panels. Closures shall be field cut to fit properly between the panel seams.

F. Sealant: Field applied sealant and/or butyl tape shall be as recommended by the manufacturer of the metal panel system.

A. Roof System

1. The roof panel system shall be composed of the following:

a. Panels shall be 24 gauge hot dipped galvanized (G-90) steel in accordance with ASTM A653.

b. Finish: Flouropolymer finish to be Kynar 500. Coating to be two-coat, thermo-cured, full-strength 70% "Kynar 500" fluouropolymer coating. Manufacturer warrants that coating shall not blister, peel, crack, chip, or experience rust-through for ten (10) years.

c. Gutter and Downspouts: Provide gutter and downspout to match roof panel.

d. All panels to be in one continuous length without lap joints within the individual run.

a. Color: As shown on Exterior Finish Index or as selected from manufacturers list of standard colors.

B. Roof Openings

1. Panel Manufacturer is responsible for flashing roof panel system to divert water from roof surface.

2. Flashing metal shall match the color of the formed metal panel.

2.04 MISCELLANEOUS MATERIALS

A. Accessories: Except as indicated as work of another specification section, provide components required for a complete roof panel system, including trim, closures, clips, seam covers, flashings, sealants, gaskets, fillers, and similar items. Match materials and finishes of panels.

1. This Contractor shall provide and install all additional structural material required to install the roof systems that has not been shown on the Drawings.
2. Refer to Section 07 62 00 for additional flashing requirements.

B. Unless noted otherwise, provide the following sheet metal accessories, factory-formed of the same material in the same finish as roof panels:

1. Flashings

C. Underlayment: Asphalt impregnated roofing felt, 30 lbs. per square over roof sheathing.

D. Sealing Tape: Pressure-sensitive, 100 percent solids gray polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2" wide and 1/8" thick.

E. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone rubber sealant, as recommended by the building manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate metal roof system with rain drainage work, flashing, trim and construction of walls, and other adjoining work, to provide a permanently leakproof, secure and non-corrosive installation.

3.02 INSTALLATION

A. Manufacturer's Recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacture of sheet metal being fabricated and installed.

B. Separate dissimilar metals from each other by painting each metal surface in area of contact with a bituminous coating, or by applying adhesive polyethylene underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

C. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings and other components of metal roof system to profiles, patterns and drainage arrangements shown, and as required for permanently leakproof construction. Provide for thermal expansion and contraction of the work. Seal joints as shown, and as required for leakproof construction. Shop fabricate materials to greatest extent possible.

D. Sealant Type Joints: Where sealant filled joints are used, embed hooked flanges of joint members not less than 1" into sealant. Form joints to completely conceal sealant. When ambient temperature is moderate at time of installation (40 deg. to 70 deg. F), set joint members for 50% movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant type joints at temperatures below 40 deg. F. Comply with requirements of Division 07 - Sealant section for the handling and installation of sealants.

E. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves and avoidable tool marks considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Except as otherwise shown, fold back sheet metal to form a hem on concealed side of exposed edges.

F. Conceal fasteners and expansion provisions where possible in exposed work, and locate so as to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

G. Erection shall be in accordance with the approved erection instructions and Drawings and the requirements herein.

H. Sheets with improper or mislocated drill holes will be rejected.

I. Exposed surfaces shall be kept clean and free from sealant, metal cuttings, and other foreign materials.

J. Field cutting or burning of misaligned connections, openings and/or roof framing shall not be permitted.

K. Stained, discolored, or damaged sheets shall be removed from the site.

L. Arrange and next side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line. Protect factory finishes from damage.

M. Roof System: Fasten panels in accordance with the manufacturer's instructions.

N. Side laps and end laps of roof panels and joints at accessories shall be sealed.

O. Exposed fasteners shall be driven normal to the surface and to a uniform depth to properly seat the gasketed washers.

P. Accessories shall be fastened into framing members, except as otherwise approved.

Q. Provide expansion joints in the roof framing as required to prevent damage and distress due to temperature changes.

R. Sheet Metal Accessories: Install sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight mounting.

3.03 CLEANING AND PROTECTION

A. Remove protective film (if any) from exposed surfaces of metal panels, promptly upon installation. Strip with care to avoid damage to finishes.

B. Cleaning and Touch-up: Clean component surfaces of matter that could preclude paint bond. Touch up abrasions, marks, skips, or other defects to shop-primed surfaces with same type material as shop primer.

C. Provide final protection in a manner acceptable to installer, which ensures metal panel work being without damage or deterioration at time of substantial completion.

END OF SECTION

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SECTION 07 42 19 - METAL PLATE WALL PANELS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

A. Metal plate wall panel system: Including metal plate panels; panel mounting system including anchorages, strapping, shims, furring, fasteners; related flashing adapters, and masking (as required) for a complete installation.

B. The following types of work are specified in this Section:

1. Metal Plate Wall Panel System
2. Flashings
3. Matching fascia/copings when indicated.

B. Related Sections:

A. Section 06 10 00 - Rough Carpentry

B. Section 07 20 00 - Thermal Protection

C. Section 07 62 00 - Sheet Metal Flashing and Trim

1.02 DEFINITION

A. Metal Plate Wall Panel Assembly: Metal plate wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weather tight wall system based on AAMA - CW-RS -1-04 The Rain Screen Principle and Pressure Equalized Wall Design.

1.03 SYSTEM DESCRIPTION

A. General Performance: Metal plate wall panel assemblies shall comply with performance requirements without failure due to defective manufacturing, fabrication, installation, or other defects in construction. Design, fabricate, and erect a pressure equalized “rainscreen” aluminum wall panel system to meet the requirements of AAMA 508-7 Voluntary Test Method and Specifications for Pressure Equalized Rain Screen Wall Cladding Systems. The AAMA 508-7 testing must be completed and the test report must be available for review prior to the bid date of the project. The specifications are specifically as follows.

A. Pressure Equalization: ASTM E1233 Cyclic Static Air Pressure Differential Testing; Positive pressure loading to 1200 pa. (25psf) for 100 three second cycles.

B. Air Leakage: Not more that 0.06 (cfm)/sf of wall area when tested at 6.24 psf in accordance with ASTM E283.

C. Water Penetration ; Static: No water infiltration under static pressure when tested in accordance with ASTM E331 at a differential of 10% of inward acting design load, 15.00 psf min. after 15 minutes.

D. Water Penetration; Dynamic: AAMA 501.1 Dynamic Water Test at a minimum of 300 Pa (6.24 psf.)

E. Structural: Provide systems that have been tested in accordance with ASTM E330 and have been certified to be without permanent deformation or failures of structural members.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

   A. Product Data: Submit metal manufacturers and fabricator's specifications, installation instructions, and general recommendations for wall panel applications. Include certification or other data substantiating that materials comply with requirements.

   B. Samples: For each type of exposed finish required, submit 8" square samples of specified metal to be used as wall panels with specified finishes applied.

B. Shop Drawings: Submit Shop Drawings showing fabrication and installation layouts of metal plate wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work. Show expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.

   A. Submit Accessories: Include details of the following items, at a full scale. Not less than 12inches in length.

   1. Manufacturers Standard Extrusions.

C. Coordination Drawings: Exterior elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

   1. Metal plate wall panels and attachments.
   2. Girts
   3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
   4. Penetrations of wall by pipes and utilities.

D. Qualification Data: For Manufacturer

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

F. Maintenance Data: For metal plate wall panels to include in maintenance manuals.

G. Warranties: Sample of Manufacturers standard warranty

1.05 QUALITY ASSURANCE

A. Installer: A firm with five years of prior successful experience with installation of metal panel systems of type and scope equivalent to work of this Section. Installer shall be certified in writing by the manufacturer to be an authorized and franchised dealer of the system to be furnished. Certification shall state date on which authorization was granted.

B. Source Limitations:
   1. Source Limitations: Obtain each type of metal plate wall panel from single source from single manufacturer.
   2. Installer: Pre-Qualified Company specializing in performing the work of this Section shall install the system in strict compliance with the written “Installation Guide.”

C. Obtain each type of metal plate wall panel from single source from single manufacturer.

D. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of "Architectural Sheet Metal Manual" by SMACNA. Conform to dimensions and profiles shown.

E. The intent of these Specifications is to establish a quality and performance level for structural design, material, durability, and workmanship.

F. All bidders must conform strictly to these Specifications in their Bid.

G. The metal plate panel manufacturer shall be United States based and demonstrate it has been in the business of furnishing (and/or erecting) complete building systems of similar size and complexity for a minimum of ten (10) years.

   A. Building system manufacturer shall be American Institute of Steel Construction, Category MB Certified.

   B. All materials shall be new, unused, free from defect.

H. The following criteria shall also be applicable in other phases of design:

   A. Building Code having jurisdiction over the area in which the site is located.

   B. Structural Steel Painting Council Standards

   C. Federal, Military, and Commercial Standards

   D. ASTM Standards

   E. Written Certification of Rating by: Underwriters Laboratories, Inc.: Class 90 Rating (U.L. Test 580). Factory Mutual Engineering Association: Class 1 and 1-90 Windstorm Classification.

I. Certification: Submit written certification prepared and signed by a professional engineer registered to practice in the State in which the Project is located, verifying that the system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.

J. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

   1. Build mockup of typical wall panels and typical details as shown on Drawings or as directed by Architect, at a minimum include 4 panels indicating a four-way joint of the panels by full thickness, including supports, attachments, and accessories. .

   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

   3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials other than framing and structural members shall be covered with weathertight coverings and kept dry. Storage accommodations for metal plate wall panel covering shall provide good air circulation and protection from surface staining.

B. Store and erect metal plate wall panels in a manner to prevent bending, warping, twisting, and surface damage. Do not store panels horizontally. Always store vertically with top of panel down.

C. Remove strippable protective covering on metal plate wall panel prior to installation.

1.07 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal plate wall panels to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal plate wall panel fabrication and indicate measurements on Shop Drawings.

1.08 COORDINATION

A. Coordinate metal plate wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work.

1.09 WARRANTY

A. The following guarantees shall be provided by the metal plate panel system manufacturer:

A. Durability of the wall panels against rupture, structural failure, or perforation shall be guaranteed for a period of ten (10) years.

B. The color finish for the wall panels shall be guaranteed by the building manufacturer for standard term against blistering, peeling, cracking, flaking, checking, and chipping. Excessive color change and chalking shall be guaranteed for ten (10) years.

B. Provide manufacturer's written weathertightness warranty for a maximum of ten (10) years against leaks in wall panel system.

PART 2 PRODUCTS

2.01 PANEL MATERIALS

A. Aluminum Plate: Alloy and temper as recommended by manufacturer for application and in strict adherence to Manufacturers “Design Guide”. Dri-Design® Wall Panel System of 3003-H14 Aluminum. Thickness shall be .080” per the requirements of the project and manufacturer or unless otherwise specified.

2.02 MISCELLANEOUS METAL FRAMING

A. Subgirts: Minimum 14ga. flat strap, Nominal thickness.

2.03 MISCELLANEOUS METAL FRAMING

A. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated.

B. Panel Fasteners: Suitable fasteners designed to withstand design loads. Stainless or other equivalent corrosive resistant fastener with a minimum 7/16” diameter head.

2.04 METAL PLATE WALL PANELS

A. Metal Plate Wall Panels: Provide factory-formed, metal plate wall panels fabricated from single sheets of metal formed into Dri-design dry-joint pressure equalized rainscreen system with interlocking gutter and drainage system integral to the panel with single horizontal attachment to complete dry-joint rainscreen assembly. The use of secondary drainage channels, brackets, support pins, joint sealants or gaskets to manage the drainage of the system are not allowed.

A. Product Basis for Design: Panels shall be manufactured by **Dri-Design, Holland, Michigan. (616) 355-2970** subject to compliance with manufacturers requirements, provide the following:

a. Dri-design Painted Aluminum Wall Panels; Dri Design (616-355-2970)

b. Or a tested equal approved by Architect

B. Material: Tension-leveled, smooth 3003-H14 Aluminum. Thickness shall be .080”

C. Panel Depth: 1.25”. Reference drawings for additional profiles.

D. Exterior Finish: Kynar resin finish as manufactured by Valspar, PPG, Akzo Noble or equivalent.

E. Color: Custom color to match sample provided by Architect. Refer to Exterior Finish Index.

2.05 ACCESSORIES

A. Metal Plate Wall Panel Accessories: Provide components required for a complete metal plate wall panel assembly including trim, copings, fascia, mullions, sills, corner units, flashings, and similar items. Match material and finish of panels unless otherwise indicated.

B. Manufacturers Standard Extrusions: Formed from extruded aluminum. Provide integral drainage system and manufactures standard extrusions at termination of dissimilar materials.

C. Flashing and Trim: Same material, finish, and color as adjacent metal plate wall panels, minimum 0.040 inch thick unless otherwise indicated.

D. Weather Resistive Barriers: Provide a weather barrier with performance characteristics for Air Penetration, Water Vapor Transmission and Water Penetration Resistance. Weather Barriers can be climate specific.

1. Refer to Section 07 20 00 Thermal Protection for additional Air Barrier requirements.

2.06 FABRICATION

A. General: Panels shall be factory fabricated and finished by manufacturer to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

2.07 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.08 ALUMINUM FINISHES

A. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2.09 MISCELLANEOUS MATERIALS

A. Accessories: Except as indicated as work of another specification section, provide components required for a complete metal plate wall panel system, including trim, closures, clips, seam covers, flashings, sealants, gaskets, fillers, and similar items. Match materials and finishes of panels.

1. This Contractor shall provide and install all additional structural material required to install the wall systems that has not been shown on the Drawings.

2. Refer to Section 07 62 00 for additional flashing requirements.

B. Unless noted otherwise, provide the following sheet metal accessories, factory-formed of the same material in the same finish as wall panels:

1. Flashings and terminations at adjacent materials installed by other trades.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal plate wall panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal plate wall panel manufacturer.

2. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal plate wall panels to verify actual locations of penetrations relative to seam locations of panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous metal plate wall panel support members and anchorage according to ASTM C 754 and panel manufacturer's written instructions.

3.03 METAL PLATE WALL PANEL INSTALLATION

A. General: Install metal plate wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels according to manufacturer's pressure equalized rainscreen installation method in strict accordance to the manufacturer’s installation guidelines. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Commence metal plate wall panel installation

2. Shim or otherwise plumb substrates receiving metal plate wall panels.

3. Flash and seal metal plate wall panels with weather closures at perimeter of all openings. Do not begin installation until weather barrier and flashings that will be concealed by panels are installed.

4. Install flashing and trim as metal plate wall panel work proceeds.

5. Provide weather tight escutcheons for pipe and conduit penetrating exterior walls.

B. Fasteners:

1. Aluminum Plate Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

2. Copper Plate Wall Panels: Use copper, stainless-steel, or hardware-bronze fasteners.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal plate wall panel manufacturer.

D. Attachment System, General: Install attachment system required to support metal plate wall panels and to provide a complete weather tight wall system, including subgirts, manufacturer's extrusions, flashings and trim.

1. Include attachment to supports and extrusion trims at dissimilar-materials
2. Do not apply sealants to joints unless otherwise indicated on Drawings or Manufacturers Shop Drawings.
3. Include manufactures starter extrusion at base course and at cut panel locations

E. Rainscreen-Principle Installation: Provide manufacturer's standard pressure-equalized, rainscreen-principle system factory-formed, metal plate wall panels fabricated from single sheets of metal formed with interlocking gutter and drainage system integral to the panel with single horizontal attachment to complete dry-joint rainscreen assembly. The use of secondary drainage channels, brackets, support pins, joint sealants or gaskets to manage the drainage of the system are not allowed. Attach metal plate wall panels in a progressive interlocking method by engaging bottom of panel in top of previous panel working left to right.

1. Install metal plate wall panels with single top attachment in pre-punched holes to allow individual panels to free-float. Do not fasten perimeter of panel or compromise internal gutter.
2. Do not apply sealants to joints unless otherwise indicated on Drawings at dissimilar materials.

3.04 METAL PLATE WALL PANEL INSTALLATION

A. General: Install accessories with positive anchorage to building and weather tight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal plate wall panel assembly including trim, copings, corner and standard extrusion covers, flashings and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

C. Weather Resistive Barrier: Install Air& Moisture barrier behind metal plate panels over substrate according to the requirements specified in Refer to Section 07 20 00 Thermal Protection for additional Air Barrier requirements.

3.05 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal plate wall panel units within installed tolerance of 1/4 inch in 20 feet, non-cumulative, on level, plumb, and location lines as indicated.

3.06 CLEANING AND PROTECTION

A. Remove protective film (if any) from exposed surfaces of metal panels, promptly upon installation. Strip with care to avoid damage to finishes.

B. On completion of metal plate wall panel installation, clean finished surfaces as recommended by panel manufacturer.

C. After metal plate wall panel installation, clear weep holes and drainage channels of obstructions, dirt.

D. Replace metal plate wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. Provide final protection in a manner acceptable to installer, which ensures metal panel work being without damage or deterioration at time of substantial completion.

END OF SECTION

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SECTION 07 54 23 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Adhered TPO membrane roofing system.
2. Dew Point Calculations.
3. Roof insulation.
4. Flood Test requirements.

B. Related Sections:
1. Section 06 10 00 - Rough Carpentry
2. Section 07 20 00 - Thermal Protection
3. Section 07 62 00 - Sheet Metal Flashing and Trim
4. Section 07 92 00 – Joint Sealants
5. Division 22 Section for Roof Drains

1.3 DEFINITIONS

A. TPO: Thermoplastic polyolefin.

B. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
1. Manufacturer shall provide dew point verifications and calculations. Areas of roof assembly that are suspect for isolation and collection of unwanted moisture, and

inadequate ventilation, shall be brought to the attention of the Architect. Submit all concerns as part of the submittal process.

D. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.

1. Fire/Windstorm Classification: Class 1B-90.
2. Hail Resistance: SH.

E. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
2. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Roof plan showing orientation of steel roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened membrane roofing.
4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

D. Samples for Verification: For the following products:

1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
2. Roof insulation.
3. Walkway pads or rolls.
4. Battens.
5. Six insulation fasteners of each type, length, and finish.
6. Six roof cover fasteners of each type, length, and finish.

E. Qualification Data: For qualified Installer and manufacturer.

F. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.

H. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES.

I. Field quality-control reports.

J. Maintenance Data: For roofing system to include in maintenance manuals.

K. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is FM Approvals approved for membrane roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

C. Source Limitations: Obtain components including roof insulation fasteners for membrane roofing system from same manufacturer as membrane roofing.

D. Exterior Fire-Test Exposure: ASTM E 108, Class B; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

E. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

F. Flood Test Requirements: Review methods with Owner and Architect prior to completing the test.

G. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate boards, roofing accessories, and other components of membrane roofing system.
2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TPO MEMBRANE ROOFING

A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle SynTec Incorporated.
b. Custom Seal Roofing.
c. Firestone Building Products Company.
d. GAF Materials Corporation.

e. GenFlex Roofing Systems.
f. Johns Manville.
g. Mule-Hide Products Co., Inc.
h. Stevens Roofing Systems; Division of JPS Elastomerics.
i. Versico Incorporated.

2. Thickness: 45 mils (1.1 mm), nominal.
3. Exposed Face Color: White

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Plastic Foam Adhesives: 50 g/L.
b. Gypsum Board and Panel Adhesives: 50 g/L.
c. Multipurpose Construction Adhesives: 70 g/L.
d. Fiberglass Adhesives: 80 g/L.
e. Contact Adhesive: 80 g/L.
f. Other Adhesives: 250 g/L.
g. Single-Ply Roof Membrane Sealants: 450 g/L.
h. Nonmembrane Roof Sealants: 300 g/L.
i. Sealant Primers for Nonporous Substrates: 250 g/L.
j. Sealant Primers for Porous Substrates: 775 g/L.

B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as sheet membrane.

C. Bonding Adhesive: Manufacturer's standard.

D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

F. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.3 SUBSTRATE BOARDS

A. Substrate Board: ASTM C 728, perlite board, 3/4 inch (19 mm) thick, seal coated.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.4 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class I, Grade 3, felt or glass-fiber mat facer on both major surfaces.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.5 INSULATION ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

D. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, 1/2 inch (13 mm) thick.

E. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

2.6 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.
   1. Exposed Face Color: White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
5. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

D. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking," according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

3.3 SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

1. Fasten substrate board to deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
2. Fasten substrate board to deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

3.4 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together and fasten to roof deck.

1. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.5 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.

B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.

E. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.

F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

H. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

3.6 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Flood Test: After the completed roof install, plug the roof drains and flood the roof to a maximum water level of 6” above the roof drain inlet elevations. Test to be completed only on the upper main roof area. All leaks shall be remedied.

3.8 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 61 00 - SHEET METAL ROOFING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Extent of metal roofing is shown on the Drawings and indicated by provisions of this Section.
2. The following types of work are specified in this Section:
   a. Standing Seam Roof System
   b. Flashings
   c. Matching Fascia

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 07 20 00 - Thermal Protection
3. Section 07 42 13 – Metal Wall Panels
4. Section 07 62 00 - Sheet Metal Flashing and Trim

1.02 SYSTEM DESCRIPTION

A. Air Infiltration: Provide Roof Panel System with no air leakage of not more than 0.09 cfm/sq. ft. of fixed roof area when tested in accordance with ASTM E1680 at a static-air-pressure difference of 4.0 lbf/sq. ft.

B. Water Penetration: Provide Roof Panel System with no water penetration as defined in the test method when tested with ASTM E1646 1646 at a minimum differential pressure of 20 percent of inward acting, wind-load design pressure of not less than 6.24 PSF and not more than 12.0 PSF.

C. Metal roof system shall be grounded in accordance with local Codes, as approved by the Building Department. This Contractor shall provide a provision for connection of roof grounding system to building ground system by Electrical Contractor. Coordinate with Electrical Contractor as required for complete grounding system.

D. Thermal Movement:

1. Design to accommodate movements of roofing materials and substrates due to thermal changes in the widest range expected for the climatic conditions in which the project is located.
2. Location of metal roofing rigid connector to be designed per job conditions by roof system manufacturer.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Submit metal manufacturers and fabricator's specifications, installation instructions, and general recommendations for roofing applications. Include certification or other data substantiating that materials comply with requirements.
2. Samples: Submit 8" square samples of specified metal to be used as roofing with specified finishes applied.

B. Shop Drawings: Submit Shop Drawings showing manner of forming, joining, and securing metal roofing, and pattern of seams. Show expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.

1.04 QUALITY ASSURANCE

A. Installer: A firm with five years of prior successful experience with installation of metal roofing of type and scope equivalent to work of this Section. Installer shall be certified in writing by the manufacturer to be an authorized and franchised dealer of the system to be furnished. Certification shall state date on which authorization was granted.

B. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of "Architectural Sheet Metal Manual" by SMACNA. Conform to dimensions and profiles shown.

C. The intent of these Specifications is to establish a quality and performance level for structural design, material, durability, and workmanship.

D. All bidders must conform strictly to these Specifications in their Bid.

E. The metal roofing manufacturer shall be United States based and demonstrate it has been in the business of furnishing (and/or erecting) complete building systems of similar size and complexity for a minimum of ten (10) years.

1. Building system manufacturer shall be American Institute of Steel Construction, Category MB Certified.

2. All materials shall be new, unused, free from defect.

F. The following criteria shall also be applicable in other phases of design:

1. Building Code having jurisdiction over the area in which the site is located.

2. Structural Steel Painting Council Standards

3. Federal, Military, and Commercial Standards

4. ASTM Standards

5. Written Certification of Rating by: Underwriters Laboratories, Inc.: Class 90 Rating (U.L. Test 580). Factory Mutual Engineering Association: Class 1 and 1-90 Windstorm Classification.

G. Certification: Submit written certification prepared and signed by a professional engineer registered to practice in the State in which the Project is located, verifying that the system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials other than framing and structural members shall be covered with weathertight coverings and kept dry. Storage accommodations for roof and wall covering shall provide good air circulation and protection from surface staining.

1.06 WARRANTY

A. The following guarantees shall be provided by the metal roofing manufacturer:

1. Durability of the roof panels against rupture, structural failure, or perforation shall be guaranteed for a period of ten (10) years.

2. The color finish for the roof and wall panels shall be guaranteed by the building manufacturer for standard term against blistering, peeling, cracking, flaking, checking, and chipping. Excessive color change and chalking shall be guaranteed for ten (10) years.

B. Provide manufacturer's written weathertightness warranty for a maximum of ten (10) years against leaks in roofing system. Warranty shall be signed by both the manufacturer of the metal roofing system and the metal roofing system installer.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Standing Seam Tee-Panel System"; Berridge Manufacturing Company (800-231-8127)
2. "Dutch Seam (MRD) Panel System"; ATAS International, Inc. (800-468-1441)
3. “Snap-On-Seam SS10-12 Panel System”; Dimensional Metals Inc. (DMI) (800-828-1510)
4. "Snap-Clad Panels"; Petersen Aluminum Corporation (PAC-CLAD) (800-722-7150)

2.02 DESIGN LOADS

A. The basic design loads shall include roof live and snow (where applicable), wind (both external and internal), and earthquake (where applicable), in addition to dead load. All other foreign loads, whether they be of static, dynamic, or kinetic nature, shall be considered as auxiliary loads. Refer to Drawings for design loads.

2.03 ROOF COVERING

A. All roof constructions shall carry the Underwriters Laboratories Construction (Uplift) rating of not less than Class 90.

B. Roof System

1. The roof system shall be composed of the following:
   a. Panels shall be nominal 12-3/4" seam on center with snap-on seam. Fabricate from 24 gauge hot dipped galvanized (G-90) steel in accordance with ASTM A653.
   b. Flouropolymer finish to be Kynar 500. Coating to be two-coat, thermo-cured, full-strength 70% "Kynar 500" fluouropolymer coating. Manufacturer warrants that coating shall not blister, peel, crack, chip, or experience rust-through for ten (10) years.
   c. Custom panel widths at both ends of panel run to provide a continuous panel formed to the shape of the substrate allowing the panel leg to extend vertically and counterflash at the rake condition.
   d. All panels to be in one continuous length without lap joints within the individual run.
   e. Color: As shown on Exterior Finish Index or as selected from manufacturers list of standard colors.
2. Deflection of the roof panel shall not exceed L/180 of its span when supporting the applicable vertical live loads previously prescribed.

C. Roof Openings

1. Openings 12" or smaller shall be flashed by the metal roofing manufacturer.

2.04 MISCELLANEOUS MATERIALS

A. Accessories: Except as indicated as work of another specification section, provide components required for a complete roof and wall panel system, including gable and other trim, perforated and non-perforated soffit panels, closures, clips, seam covers, battens, flashings, sealants, gaskets, fillers, and similar items. Match materials and finishes of panels.

1. This Contractor shall provide and install all additional structural material required to install the roof and wall systems that has not been shown on the Drawings.

2. Refer to Section 07 60 00 for additional flashing requirements.

B. Unless noted otherwise, provide the following sheet metal accessories, factory-formed of the same material in the same finish as roof panels:

1. Ridge Covers

2. Vented Ridge Cap

3. Fascias

4. Soffit System

5. Flashings

6. Gutters (When adjacent to metal roofing)

C. Underlayment: Asphalt impregnated roofing felt, 30 lbs. per square over roof sheathing.

D. Sealing Tape: Pressure-sensitive, 100 percent solids gray polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2" wide and 1/8" thick.

E. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone rubber sealant, as recommended by the building manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate metal roofing and wall system with rain drainage work, flashing, trim and construction of decks, parapets, walls, and other adjoining work, to provide a permanently leakproof, secure and non-corrosive installation.

3.02 INSTALLATION

A. Manufacturer's Recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacture of sheet metal being fabricated and installed.

B. Separate dissimilar metals from each other by painting each metal surface in area of contact with a bituminous coating, or by applying adhesive polyethylene underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

C. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings and other components of metal roofing to profiles, patterns and drainage arrangements shown, and as required for permanently leakproof construction. Provide for thermal expansion and contraction of the work. Seal joints as shown, and as required for leakproof construction. Shop fabricate materials to greatest extent possible.

D. Sealant Type Joints: Where sealant filled joints are used, embed hooked flanges of joint members not less than 1" into sealant. Form joints to completely conceal sealant. When ambient temperature is moderate at time of installation (40 deg. to 70 deg. F), set joint members for 50% movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant type joints at temperatures below 40 deg. F. Comply with requirements of Division 07 - Sealant section for the handling and installation of sealants.

E. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves and avoidable tool marks considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Except as otherwise shown, fold back sheet metal to form a hem on concealed side of exposed edges.

F. Conceal fasteners and expansion provisions where possible in exposed work, and locate so as to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

G. Erection shall be in accordance with the approved erection instructions and Drawings and the requirements herein.

H. Sheets with improper or mislocated drill holes will be rejected.

I. Exposed surfaces shall be kept clean and free from sealant, metal cuttings, and other foreign materials.

J. Field cutting or burning of misaligned connections, openings and/or wall framing shall not be permitted.

K. Stained, discolored, or damaged sheets shall be removed from the site.

L. Arrange and next side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line. Protect factory finishes from damage.

1. Provide weatherseal under ridge cap. Flash and seal roof panels at eave and rake with rubber, neoprene, or other closures to exclude weather.

M. Roof System: Fasten panels in accordance with the manufacturer's instructions.

N. All exposed fasteners shall be approved in advance by the Architect.

O. Side laps and end laps of roof and wall covering and joints at accessories shall be sealed.

P. Exposed fasteners shall be driven normal to the surface and to a uniform depth to properly seat the gasketed washers.

Q. Accessories shall be fastened into framing members, except as otherwise approved.

R. Provide expansion joints in the roofing and/or roof framing as required to prevent damage and distress due to temperature changes.

S. Sheet Metal Accessories: Install curbs and other sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight mounting.

3.03 CLEANING AND PROTECTION

A. Remove protective film (if any) from exposed surfaces of metal roofing, promptly upon installation. Strip with care to avoid damage to finishes.

B. Cleaning and Touch-up: Clean component surfaces of matter that could preclude paint bond. Touch up abrasions, marks, skips, or other defects to shop-primed surfaces with same type material as shop primer.

C. Provide final protection in a manner acceptable to installer, which ensures metal roofing being without damage or deterioration at time of substantial completion.

END OF SECTION

Revision Log

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Flashing at Roof, Windows, Doors, and other locations as shown on Drawings
2. Areas on Drawings indicated as Ice and Water Shield.
3. Roof Drainage Systems:
    a. Gutters
    b. Downspouts
4. Aluminum Formed Cap Flashings (Copings)
5. Fasteners

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 07 20 00 - Thermal Protection: Air Infiltration Barriers
3. Section 07 24 19 – Water Drainage Exterior Insulation and Finish Systems (EIFS)
4. Section 07 41 13 – Metal Roof Panels
5. Section 07 42 19 – Metal Plate Wall Panels
6. Section 07 54 23 – Thermoplastic Polyolefin (TPO) Roofing
7. Section 07 61 00 – Sheet Metal Roofing
8. Section 07 72 33 - Roof Specialties: Roof Hatches
9. Section 07 92 00 – Joint Sealants
10. Section 08 11 13 - Steel Doors and Frames
11. Section 08 41 13 - Aluminum Entrances and Storefronts
12. Section 08 42 29 - Automatic Entrances
13. Section 08 51 13 - Aluminum Windows
14. Section 23 81 13 - Packaged Terminal Air-Conditioning Units
15. Section 23 37 00 - Air Inlets & Outlets
16. Division 22 Sections
17. Division 23 Sections

1.02 REFERENCES

A. ASTM D1079 “Standard Terminology Relating to Roofing, Waterproofing, and Bituminous Materials”

B. ASTM D1970 “Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection”

C. ASTM D6221 “Standard Specification for Reinforced Bituminous Flashing Sheets for Roofing and Waterproofing”

D. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "Architectural Sheet Metal Manual", Current Edition

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) with the following supporting data:

1. Submit Shop Drawings, color samples, product information, and samples clearly detailing shaping, jointing, length of sections, fastening, and installation details.

2. Manufacturer’s standard color charts for selection purposes.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.

B. Do not proceed with the installation of flashing and sheet metal work until curb and substrate construction, cant strips, blocking, reglets, and other construction to receive the work is completed.

C. Flashing and sheet metal shall be installed in accordance with Factory Mutual Engineering and Research requirements.

D. The installer must examine the substrate and the conditions under which flashing and sheet metal work is to be performed, and notify the Owner's representative in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

1.05 PROJECT CONDITIONS

A. Existing Conditions:

1. Exercise care when working on or about roof surfaces to avoid damaging or puncturing membrane or flexible flashings.

2. Place plywood panels on roof surfaces adjacent to work of this Section and on access routes. Keep in place until completion of work.

B. Roofing and flashing shall not be applied during precipitation and shall not be started in the event there is a probability of precipitation during application. Metal faced flashing shall not be applied when ambient temperature is below 35 degrees F.

C. Do not install Membrane Flashing Systems on wet or damp surfaces. Surfaces should also be free from dirt, oils, lubricants or other debris that may inhibit adhesion of the flashing tape to the substrate. After precipitation, allow a minimum of 24 hours for drying before installing the flashing tape. For optimal performance, install at temperatures above 40 degrees F.

D. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Protect materials from rain and physical damage. Provide cover on top and on all sides, allowing for adequate ventilation. Store flashing where temperatures will not exceed 90 degrees F for extended periods. Store all products in a dry area away from high heat, flames or sparks.

C. Store Membrane Flashing System products in manufacturer's unopened packaging until ready for installation and dispense the needed amounts of materials from the manufacturer box.

1.07 WARRANTY

A. Provide Owner with warranty stating that flashing material and metal wall fascia will properly shed water and protect roof and wall from physical damage for a minimum period of five years from date of Substantial Completion and the damage resulting from failure to provide above stated performances will be repaired to satisfaction of Owner at no additional cost.

PART 2 PRODUCTS

2.01 ALUMINUM FLASHING AND SHEET METAL

A. Materials:

1. Aluminum Sheet: ASTM B209, Alloy 3003, Temper H14, AA-C22A41, minimum .032 inch thick (20 ga) sheet. 5-year Kynar Finish or Thermo-Setting acrylic enamel where exposed.
2. Fasteners: Concealed type; of same material as flashings; sized to suit application.
3. Size and shape as shown on Drawings.
4. Color: Refer to Exterior Finish Index.

2.02 GUTTERS & DOWNSPOUTS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Alcoa Building Products (800-962-6973)
2. Alside, Inc. (800-257-4335)
3. Approved substitution

C. Materials:

1. Seamless, continuous, gutters to be minimum 032" thick, downspouts to be minimum .024" thick, sheet aluminum conforming to requirements of ASTM B209, Alloy 3003, Temper H14, finish to be thermo-setting acrylic enamel conforming to AAMA 603.8.
2. Color: As shown on Exterior Finish Index.
3. Size and Shape:
   a. Gutters: SMACNA Style K, or as shown on Drawings. Minimum nominal 6" top and 4-3/4" height
   b. Downspouts: Minimum 4" x 6" rectangular, smooth, shape as indicated on Drawings.
4. Accessories:
   a. Gutters:
      1) End caps
      2) Hangers: Concealed
      3) Non-corrosive leaf screens at gutters.
   b. Downspouts:
      1) Elbows

2) Straps: Minimum two per downspout

3) Strainers

4) Transition from downspout to underground storm piping: Advanced Drainage Systems, Inc. (800-821-6710), model 4-465.

5) Provide splash-blocks where required. Units shall be concrete, minimum 3,000 psi at 28 days with 5% air entrainment. Size and profile to suit application.

2.03 ALUMINUM SOFFITS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Aluma-Guard Plus"; Alcoa Building Products (800-962-6973)
2. "Commercial Triple 4 Center Vent"; NAPCO, Inc. (800-786-2726)
3. "Wind-Lok Soffit Panels"; ATAS International, Inc. (800-468-1441)

C. Materials:

1. Soffits to be sheet aluminum, alloy 3105-H26P.
2. Dimensions:
   a. Thickness: Minimum .019"
   b. Width: 12" wide, 3/8" deep with wide faces forming U grooves at 4" O.C.
3. Finish: Two-coat water-base acrylic complying with AAMA 1402.
   a. Dry Film Thickness: 0.9 to 1.0 mils.
   b. Gloss: 10 to 14 at 60 degrees, when evaluated in accordance with ASTM D 523.
   c. Adhesion: Excellent, when tested in accordance with ASTM D 3359.
   d. Humidity Resistance: No loss of gloss, cracking or peeling, when tested in accordance with ASTM D 2247 with 1,000 hours of exposure at 100 percent relative humidity.
   e. Salt Spray Resistance: No under-cutting of film from edges in excess of 1/16 inch or face blistering, when tested in accordance with ASTM B 117 with 3,000 hours at 5 percent neutral salt spray.
   f. Fade Resistance: Maximum color difference of 5 when evaluated in accordance with ASTM D 2244 after 10 years at 45 degrees South Florida exposure, after removing external deposits.
4. Ventilation: Perforated design
   a. Free Air Space area: 4.4 sq. in per lineal feet net free area in center panel only.

D. Accessories: Provide as required for a complete installation as indicated and specified.

1. "J" Channel
2. "F" Channel
3. "T" Trim
4. Pre-finished 0.019" aluminum coil material.
5. Nails: Manufacturers standard aluminum nails of 5056 or 6010 alloy.

E. Finishes:

1. Color: As shown on Exterior Finish Index.
2. Texture: “Non-Wood Grain”, smooth matte texture.

2.04 ALUMINUM FORMED CAP FLASHING

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Perma-Tite Coping (Tapered)"; Metal-Era, Inc. (800-558-2162)
2. “Permasnap Coping”; W.P. Hickman Company (800-313-9543)
3. “Press-Loc Coping”; Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc. (800-334-9823)

C. Aluminum Formed Cap Flashing shall be smooth aluminum, 0.050 thickness, custom size and shape as shown on Drawings. All joints shall receive concealed splice plates to accommodate thermal movement. Provide premanufactured inside and outside corners as required. Stainless steel screws and washers shall be used for installation.

1. Finish: 5-year Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluouropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604 where exposed.
2. Color as shown on Exterior Finish Index.
3. Fasteners: Concealed type; Series 300 stainless steel screws and washers; sized to suit application.

2.05 MEMBRANE FLASHING

A. Wall Flashing:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers:
   a. "Perm-A-Barrier" wall flashing and "Perm-A-Barrier" primer and stainless steel drip edge; W.R. Grace & Company (800-778-2880)
   b. “Hyload SA with Stainless Steel Drip Edge”; Hyload Flashing (800-457-4056)
   c. “Flex Flash SA with Stainless Steel Drip Edge”; Hohman and Bernard, Inc. (800-645-0616)

B. Door & Window Opening Flashing System

1. Manufacturer:
   a. Avendra, LLC Preferred Manufacturers:
      1) None
   b. Approved Manufacturers:
      1) "Tyvek FlexWrap" and "Tyvek StraightFlash"; DuPont Company (800-448-9835)
2. Elasticized Flexible Flashing Tape complying with the following:

a. Face Material composition: Elasticized polyethylene laminate.

b. Face color: White.

c. Adhesive composition; Butyl adhesive containing non-halogen fire retardant additive

d. Thickness: > 60 mils.

e. Release liner: 2 part siliconized paper.

f. Elastic Elongation, MD (length @ Full Extension / Length @ Relaxed): >230% @ 70 F.

g. Dimension: 8 or 10 inch width

3. Straight Polyethylene Laminate Flashing Tape complying with the following:

a. Face Material composition: Polyethylene laminate

b. Face color: White

c. Adhesive Composition: Butyl adhesive containing fire retardant additive

d. Thickness: 30 mils

e. Release liner: 1 piece siliconized paper

f. Dimension: 4 inch width

4. Accessories:

a. Sealing Tape:

1) Material: Pressure sensitive, polypropylene substrate with acrylic based adhesive. Provides permanently elastic, nonsag, nontoxic, nonstaining tape, which is compatible with Tyvek Weatherization Systems products.

2) Finish Product Brand Name: DuPont Tyvek Contractor Tape.

b. Fasteners:

1) Material: 1" diameter plastic cap, nail length (1", 11/2", 2") for wood frame construction, or 2" diameter plastic cap with 1 5/8" drill point self tapping screw for metal stud applications, designed to withstand designed loads.

2) Finish Product Brand Name: DuPont Tyvek Wrap Caps.

c. Sealants: ASTM C 920, elastomeric polymer sealant, of type, grade, class, and use classifications required to seal joints and remain watertight and are compatible with DuPont Tyvek.

1) OSI Quad Pro-Series; solvent release kraton rubber sealant.

2) DAP DynaFlex 230™.

3) Other products as approved and recommended by the flashing tape manufacturer.

d. Primer:

1) 3M High Strength 90

2) Other products as approved and recommended by the flashing tape manufacturer.

C. Thru-Wall Flashing:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

   a. “5 oz. Copper Flashing with Stainless Steel Drip Edge”, York Manufacturing, Inc. (800-551-2828)

   b. “Flex Flashing with Stainless Steel Drip Edge”, Hohman and Bernard, Inc. (800-645-0616)

   c. "Perm-A-Barrier" wall flashing and "Perm-A-Barrier" primer and stainless steel drip edge as manufactured by W.R. Grace & Company (800-778-2880)

   d. “Hyload SA with Stainless Steel Drip Edge”, Hyload Flashing (800-457-4056)

3. Provide primers and mastic by manufacturer, as required.

2.06 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Bituminous Paint: Acid and alkali-resistant type; black color; FS TT-C-494 or SSPC-Paint 12 solvent type, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

B. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

C. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 07 Section " Joint Sealants".

D. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

E. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

F. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

2.07 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

E. Expansion Provisions: Comply with SMACNA standards. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application, but never less than thickness of metal being secured.

J. Form gutters and downspouts of profiles and sizes indicated and as required to properly collect and remove water. Fabricate complete with required connection pieces.

1. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortions and defects detrimental to appearance or performance hem exposed edges. Allow for expansion at joints. Miter gutter corners.

2.08 FABRICATION - FLASHINGS

A. Form sections square true, and accurate to size, free from distortion and other defects detrimental to appearance or performance.

B. Form sections in maximum lengths. Make allowances for expansion at joints.

C. Seams are to be standing lock or batten type except corners. Fabricate corners minimum 18 inches mitered, soldered, or welded, and sealed as one piece.

D. Wipe and wash clean, soldered joints, to remove traces of flux immediately after soldering.

E. Hem exposed edges of flashings on underside 1/2 inch.

F. Backpaint flashings with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with manufacturer's instructions and recommendations for handling and installation of flashing and sheet metal work.

B. Performance: Coordinate the work with other work for the correct sequencing of items which make up the entire membrane or system of weatherproofing or waterproofing and rain drainage. It is required that the flashing and sheet metal work be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.

C. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION – SHEET METAL

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

1. Use joint adhesive for nonmoving joints specified not to be soldered.

D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder. Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

E. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

F. Counter-flash mechanical, electrical, and other items projecting through membrane roofing.

1. Pipes and Conduit Penetrations:

a. Flash with lead sheet extending flanges 9" from wall or pipe.

b. Extend flashing up pipe and turn down inside pipe a minimum 2".

c. On tall pipe extend flashing a minimum of 9" up side of pipe and cover with galvanized malleable iron collar with draw band; seal top of collar against vent pipe.

d. Set flanges on top of sheet roofing and strip in with a 12" wide section of roofing.

G. Roof-Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Spike type anchors will not be permitted. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.

3.03 INSTALLATION - WALL FLASHINGS

A. Membrane Wall Flashing:

1. Install at all windows, doors, and other locations as shown on Drawings in strict accordance with manufacturer's specifications to provide a watertight enclosure.

2. Substrate must be smooth, clean, dry and free of voids, spalled areas, loose substrate, loose nails, other sharp protrusions or other matter that will hinder the adhesion or regularity of the flashing tape installation. Clean loose dust or dirt from surface wherever flashing tape is to be applied by wiping with a clean dry cloth or brush.

3. Apply membrane over approved primer. Membrane wall flashings shall overlap one to two inches, as recommended by manufacturer. All membrane overlaps shall be firmly rolled immediately following installation to minimize bubbles caused by outgassing air vapor.

4. Apply a bead of sealant along top edge of flashing membrane and along seams and cuts as required.

B. Install window and door flashings AFTER installation of Air Infiltration Barrier as follows:

1. Prepare Air Infiltration Barrier for window or door installation.

2. Make a modified “I-cut” in the Air Infiltration Barrier.

3. Cut a flap above the rough opening to allow head flashing installation.
4. Fold side and bottom flaps into rough opening and secure. Flip head flap up and temporarily secure.
5. Cut Elasticized Flexible Flashing Tape at least 12” longer than width of rough opening sill.
6. Remove first piece of release paper, align edge of sill flashing with inside edge of sill, and adhere into rough opening across sill and up jambs (minimum 6”). Sill flashing should not wrap onto interior surface of framing.
7. Remove the second release paper.
8. Fan Elasticized Flexible Flashing Tape at bottom corners onto face of wall.
9. Firmly press sill flashing to insure full adhesion.
10. Secure edges of bottom corners with approved sealing tape or mechanical fasteners.
11. Apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do NOT apply sealant across sill.
12. Install window or door into opening.
13. Remove release paper and install Straight Polyethylene Laminate Flashing Tape jamb flashings overlapping entire mounting flange of both jambs. Extend jamb flashings 6-inches above top of rough opening to below bottom of sill flashing.
14. Remove release paper and install Straight Polyethylene Laminate Flashing Tape as head flashing overlapping entire mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
15. Flip head flap down over the head flashing.
16. Secure flap above window with approved sealing tape.
17. Install Sealant (using backer rod if necessary) to seal rear of window/door frame to rough opening.

C. Door Head Flashing:

1. Cut head flashing at least 12” longer than the arc length of Door Head.
2. Remove both release papers and install conforming around top of door, covering entire mounting flange. Head flashing should overlap jamb flashings at least 6”.
3. To facilitate installation to door heads, remove short lengths of release papers, begin installation, and repeat to work flashing into position and complete installation.
4. Secure outer edges of head flashing with approved sealing tape or mechanical fasteners.
5. Secure flap above door head with approved sealing tape.

D. Other Openings and Penetrations: Provide flashings for other openings as required to provide weathertight barrier. Install lapped components to direct water to exterior of building.

3.04 INSTALLATION - SOFFITS

A. Install soffits and accessories in accordance with manufacturer's standard published details and installation instructions.

B. Installation of materials specified within this Section shall be in accordance with the best practice, with all joint members true and plumb.

C. Provide for expansion and contraction. Do not drive nail heads tight against nailing lock. Nail size shall be in accordance with the manufacturer's printed instruction.

D. Provide sealant applications at all locations as recommended by the soffit manufacturer.

3.05 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION

Revision Log

SECTION 07 72 33 - ROOF HATCHES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Prefabricated roof hatches with integral support curbs, operable hardware, and counterflashings.

B. Related Sections:

1. Section 07 54 23 – Thermoplastic Polyolefin (TPO) Roofing
2. Section 07 62 00 - Sheet Metal Flashing and Trim

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit product data which shall include general construction, configurations, jointing methods, and locations when applicable, and fastening methods. Include manufacturer's instructions.

1.03 QUALITY ASSURANCE

A. Standards: Comply with the following:

1. SMACNA’s Architectural Sheet Metal Manual” details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
2. NRCA’s “Roofing and Waterproofing Manual” details for installing units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. The Bilco Company (203-934-6363)
2. Approved Substitution.

2.02 ROOF HATCHES

A. Unit: 2'-6" x 4'-6" size, single leaf type, Type "NB", as manufactured by Bilco or approved substitution.

B. Curb: 11 gauge aluminum, mill finish, with one inch rigid insulation; integral cap flashing to receive roof flashing system; extended flange for mounting.

C. Cover: 11 gauge aluminum with one inch glass fiber insulation retained by 18 gauge inner liner. Continuous gasket to provide weatherproof seal.

D. Hardware: Manufacturer's standard manually operated type with compression spring operators, positive snap latch with turn handles inside and out and padlock hasp inside; automatic hold-open arm with vinyl covered grip handle for easy release, cadmium plated finish.

E. Hinges: Manufacturer's recommended type.

F. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.

2.03 ACCESSORIES

A. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2" thick.

B. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.

1. Where removing exterior exposed fasteners affords access to building, provide nonremoveable fastener heads.

C. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coating.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's written instructions. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to supporting structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.

B. Install roof accessory items according to construction details of NRCA's "Roofing and Waterproofing Manual," unless otherwise indicated.

C. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.

D. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.

E. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.02 CLEANING AND PROTECTION

A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION

Revision Log

SECTION 07 81 00 - APPLIED FIREPROOFING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Concealed Sprayed-on Fireproofing

a. New structural steel, unpainted.

2. Protection of Adjacent Surfaces from Overspraying

B. Related Sections:

1. Section 05 12 00 - Structural Steel Framing

1.02 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide sprayed-on fireproofing products identical to those used in assemblies tested for the following fire-test-response characteristics, per test method indicated below, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify packages (bags) containing fireproofing with appropriate classification markings of applicable testing and inspecting agency.

1. Fire-Resistance Ratings: As indicated by reference to fire-resistive designs listed in UL "Fire Resistance Directory", or in the comparable publication of another testing and inspecting agency acceptable to authorities having jurisdiction, for fire-resistive assemblies where sprayed-on fireproofing serves as direct-applied protection, tested per ASTM E119.

2. Surface-burning Characteristics: As indicated for each sprayed-on fireproofing product required, tested per ASTM E84.

B. Installer Qualifications: Engage an experienced installer certified, licensed, or otherwise qualified by the sprayed-on fireproofing manufacturer as having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its sprayed-on fireproofing products to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer.

C. Single-Source Responsibility: Obtain sprayed-on fireproofing materials from a single manufacturer for each different product required.

D. Provide fireproofing products containing no detectable asbestos as determined according to the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

1.03 REFERENCES

A. American Society for Testing Materials (ASTM - latest editions):

1. E84, Test for Surface Burning Characteristics of Building Materials.

2. E119, Fire Test of Building Construction and Materials.

3. E605, Thickness and Density of Sprayed Fire-resistive Material Applied to Structural Members.

4. E736, Cohesion/Adhesion of Sprayed Fire-resistive Materials Applied to Structural Members.

5. E759, Effect of Deflection of Sprayed Fire-resistive Materials Applied to Structural Members.

6. E760, Impact on Bonding of Sprayed Fire-resistive Materials Applied to Structural Members.
7. E761, Compressive Strength of Sprayed Fire-resistive Materials Applied to Structural Members.
8. E859, Air Erosion of Sprayed Fire-resistive Materials Applied to Structural Members.
9. E937, Corrosion of Steel by Sprayed Fire-resistive Materials Applied to Structural Members.
10. Underwriters Laboratories, Inc. (UL) Fire Resistance Directory.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit product data for each product indicated, including manufacturer's instructions for bonding and applying sprayed fireproofing.
2. Provide manufacturer's certification or independent test reports confirming that materials meet or exceed performance criteria specified and reports from reputable independent testing agencies, of product proposed for use, which indicated conformance to ASTM E84 and E119.
    a. Include certification by manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC).
3. Provide submittal stating that fireproofing materials meet or exceed specified requirements include the following:
    a. Where and what kinds of surface preparations are required before applying fireproofing.
    b. Extent of sprayed-on fireproofing for each different construction and fire-resistance rating including the following:
        1) Applicable fire-resistive design designations of inspecting and testing agency acceptable to authorities having jurisdiction.
        2) Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.
        3) Treatment of fireproofing after its application.
4. Product certificates from fireproofing manufacturers that each sprayed-on fireproofing product indicated for project complies with specified requirements including those for fire-test-response characteristics and compatibility with adhesives, primers, and other surface coatings on substrates indicated to receive fireproofing.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original unopened packages bearing the name of the manufacturer, the brand and proper Underwriters Laboratories, Inc. labels for fire hazard and fire resistance classifications.

B. Keep materials dry, off the ground, under cover, and away from sweating walls and other damp surfaces until ready for use. Bags exposed to water before use shall be discarded. Rotate stock material and use before expiration date.

1.06 ENVIRONMENT REQUIREMENTS

A. Maintain an air and substrate temperature of 40 deg. F. for 24 hours before and a minimum of 24 hours after application of the fireproofing. Air temperature and available ventilation based on job conditions will determine length of drying time required following initial application of the product.

B. In areas lacking natural ventilation, provide forced air circulation.

1.07 WARRANTY

A. General: The warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. Warranty: Submit a written warranty, executed by Contractor and cosigned by installer, agreeing to repair or replace sprayed-on fireproofing that has failed within the specified warranty period. Failures include, but are not limited to, the following:

1. Cracking, flaking, eroding in excess of specified requirements, peeling, and delaminating of sprayed-on fireproofing from substrates due to defective materials and workmanship within the specified warranty period.

2. Not covered under the warranty are failures attributable to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and to other causes not reasonably foreseeable under conditions of normal use.

C. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 CONCEALED SPRAYED-ON FIREPROOFING MATERIALS

A. General: For concealed applications of sprayed-on fireproofing, provide manufacturer's standard products complying with requirements indicated in this article for material composition and physical properties representative of installed products.

B. Material Composition: Composition indicated below:

1. Cementitious fireproofing consisting of factory-mixed, dry formulation of gypsum or portland cement binders and lightweight mineral or synthetic aggregates mixed with water at project site to form a slurry or mortar for conveyance and application.

C. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property listed below:

1. Bond Strength: 150 lbf per sq. ft. as determined per ASTM E736 under the following conditions:

a. Field-test sprayed-on fireproofing that is applied to flanges of wide-flange structural steel members on surfaces matching those that will exist for remainder of steel receiving fireproofing.

b. Minimum sprayed-on fireproofing thickness tested in laboratory shall be 0.75 inch.

2. Compressive Strength: 5.21 lbf per sq. inch as determined in the laboratory per ASTM E761. Minimum sprayed-on fireproofing thickness tested shall be 0.75 inch and the minimum dry density shall be as specified, but not less than 15 pcf.

3. Corrosion Resistance: No evidence of corrosion as determined per ASTM E937.

4. Deflection: No cracking, spalling, delamination or the like as determined per ASTM E759.
5. Effect of Impact on Bonding: No cracking, spalling, delamination or the like as determined per ASTM E760.
6. Air Erosion: Maximum weight loss of 0.025 gram per sq. ft. in 24 hours as determined per ASTM E859. For laboratory tests, the minimum sprayed-on fireproofing thickness is 0.75 inch, the maximum dry density is 15 pcf, test specimens are not pre-purged by mechanically-induced air velocities, and tests are terminated after 24 hours.
7. Dry Density: 15 pcf for average and individual densities regardless of density indicated in referenced fire-resistive design, or greater if required to attain fire-resistance ratings indicated as determined per ASTM E 605 or Appendix A "Alternate Method for Density Determination" of AWCI Technical Manual 12-A.
8. Thickness: Provide minimum average thickness required for fire-resistive design indicated according to the following criteria, but not less than 0.375 inch, as determined per ASTM E605.
    a. Where the referenced fire-resistive design lists a thickness of one inch or greater, the minimum allowable individual sprayed-on fireproofing thickness is the design thickness minus 0.25 inch.
    b. Where the referenced fire-resistive design lists a thickness of less than one inch, but more than 0.375 inch, the minimum allowable individual sprayed-on fireproofing thickness is the greater of 0.375 inch or 75 percent of the design thickness.
    c. No reduction in average thickness is permitted for those fire-resistive designs whose fire resistance ratings were established at densities of less than 15 pcf.
9. Surface-burning Characteristics: Maximum flame-spread value of 10 and smoke-developed value of 0.

D. Manufacturers:
1. Avendra, LLC Preferred Manufacturers:
    a. None
2. Approved Manufacturers
    a. "Monokote Type MK-6"; Grace Construction Products, W.R. Grace & Co. (800-778-2880)
    b. “Cafco 300”, Isolatek International Corp. (800-631-9600)
    c. “Southwest Type 5”; Carboline Company, an RPM Company (800-848-4645)

E. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistive designs indicated, approved by manufacturer of intumescent mastic fire-resistive material. Include pins and attachment.

F. Mixing water shall be clean, fresh, and suitable for domestic consumption and free from such amounts of mineral or organic substances as would affect the set of the fireproofing material.

G. Sprayed fireproofing materials shall be free of all forms of asbestos and asbestos contamination, including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates with installer present to determine if they are in satisfactory condition to receive sprayed-on fireproofing. A substrate is in satisfactory condition if it complies with the following:

1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
2. Substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fireproofing with substrate under conditions of normal use or fire exposure.
3. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying the fireproofing.
5. Verify that ducts, piping, equipment, or other items which would interfere with application of fireproofing materials are not positioned until fireproofing work is complete.
6. Fill voids and cracks in substrate, remove projections and level where sprayed fireproofing is exposed to view as finish material.
7. Remove incompatible materials which may affect bond of sprayed fireproofing.
8. Conduct tests according to sprayed-on fireproofing manufacturer's recommendations to verify that substrates are free of oil, rolling compounds, and other substances capable of interfering with bond where there is any doubt as to their presence.
9. Do not proceed with installation of fireproofing until unsatisfactory conditions have been corrected.
10. Starting of installation indicates acceptance of substrate by installer of fireproofing.

3.02 PREPARATION

A. Clean substrates of substances that could impair bond of fireproofing, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.

3.03 INSTALLATION, GENERAL

A. Comply with fireproofing manufacturer's instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fireproofing materials, as applicable to the particular conditions of installation and as required to achieve fire-resistance ratings indicated.

B. Apply sprayed-on fireproofing that is identical to products tested as specified in Part 1 under "Test Reports" in "Submittals" article, with respect to rate of application, use of sealers, topcoats, tamping, troweling, water overspray, or other materials and procedures affecting test results.

1. Apply fireproofing in sufficient thickness to achieve rating with as many passes as necessary to cover with monolithic blanket of uniform density and texture.

C. Extend fireproofing in full thickness over entire area of each substrate to be protected. Unless otherwise recommended by fireproofing manufacturer, install body of fireproof covering in a single course.

D. Apply fireproofing materials by sprayed-on method to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended by manufacturer.

E. Where sealers are used, apply products that are tinted to differentiate it from the sprayed-on fireproofing over which it is applied.

3.04 PROTECTION

A. Protect adjacent surfaces and equipment from damage by overspray fallout and dusting.

B. Close-off and seal ductwork in areas where fireproofing is being applied.

C. Protect applied sprayed fireproofing from damage.

3.05 FIELD QUALITY CONTROL

A. Verify the thickness and density of the fireproofing in accordance with provisions of ASTM E605 or UBC Standard No. 43-8.

B. Correct unacceptable work and provide inspection to verify compliance with requirements.

3.06 CLEANING, REPAIR, AND PROTECTION

A. Cleaning: Immediately after completing spraying operations in each containable area of project, remove material over-spray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Cure exposed cementitious fireproofing materials according to fireproofing manufacturer's recommendations to prevent premature drying.

C. Protect fireproofing, according to advice of fireproofing manufacturer and installer, from damage resulting from construction operations or other causes so that fireproofing will be without damage or deterioration at time of Substantial Completion.

D. Coordinate installation of fireproofing with other construction to minimize the need to cut or remove fireproofing. As installation of other construction proceeds, inspect fireproofing and patch any areas where fireproofing was removed or damaged.

1. Repair or replace work that has not been successfully protected.

E. Remove fireproofing from materials and surfaces not specifically required to be fireproofed.

PART 4 SCHEDULES

4.01 Sprayed-on Fireproofing Rating Schedule

Note: Below is an example of a schedule and does not apply to this Project. Must be modified to suit Project.

CONSTRUCTION	FIRE RATED VALUE	THICKNESS OF FIREPROOFING MATERIAL	UL ASSEMBLY
Steel Floor Beams	1 Hour	Per Manufacturer	D916

END OF SECTION

Revision Log

SECTION 07 84 00 - FIRESTOPPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Penetrations through fire-resistance-rated floor and roof construction, including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

2. Penetrations through fire-resistance-rated walls and partitions, including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

3. Joints at walls, floors, top of wall (head of wall) at floor and roof assemblies, edge of floor slabs at exterior walls, and openings around structural members which penetrate floor and wall assemblies.

B. Related Sections:

1. Section 07 20 00 - Mineral Fiber Fireproofing

2. Refer to Divisions 21/22/23 and 26/27 Sections for additional requirements.

1.02 SYSTEM DESCRIPTION

A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.

B. Performance Requirements:

1. F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

2. T-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist:

a. Where firestop systems protect penetrations located outside of wall cavities.

b. Where firestop systems protect penetrations located outside fire-resistive shaft enclosures.

c. Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.

d. Where firestop systems protect penetrating items larger than a 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

3. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.

4. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

    a. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

    b. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.

C. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Provide product data for each type of product specified.

    a. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

2. Provide product certificates signed by manufacturers of firestopping products certifying that their products comply with specified requirements.

3. Provide product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.

4. Provide manufacturer's engineering judgment identification number and drawing details when there is no UL, Warnock Hersey or OPL system available for an application. Engineering judgment must include both project name and the contractor’s name who will install firestop system as described in judgment drawing.

1.04 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per ASTM E814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:

    a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

    b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory", by Warnock Hersey or by another qualified testing and inspecting agency.

B. Information within construction documents referring to specific design designations of through-penetration firestop systems is intended to establish requirements for performance based on conditions that are expected to exist during installation. Any changes in conditions and designated systems require the Architect's prior approval. Submit documentation showing that the performance of proposed substitutions equals or exceeds that of the systems they would replace and are acceptable to authorities having jurisdiction.

C. Single-Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

D. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".

E. Coordinate Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration and joint firestop systems are installed per specified requirements.

F. A manufacturer's direct representative shall be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures per manufacturer's written recommendations.

G. Engineering Judgements:

1. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests shall be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping products to project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, if applicable, qualified testing and inspecting agency's classification marking applicable to project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.06 PROJECT/SITE CONDITIONS

A. Environmental Conditions: Do no install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilation: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

PART 2 PRODUCTS

2.01 FIRESTOPPING, GENERAL

A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

1. For penetrations involving CPVC piping, provide through-penetration firestop systems which include materials that have been tested to be compatible with CPVC piping.

B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include, but are not limited to, the following items:

1. Permanent Forming/Damming/Backing Materials, Including the Following:
    a. Semi-refractory Fiber (mineral wool) Insulation
    b. Ceramic Fiber
    c. Sealants Used in Combination with Other Forming/Damming Materials to Prevent Leakage of Fill Materials in Liquid State
    d. Fire-rated Formboard
2. Temporary Forming materials
3. Substrate Primers
4. Collars
5. Steel Sleeves

C. Under normal environmental conditions, all material used shall be non-corrosive to metal and compatible with synthetic cable jackets.

D. Provide all miscellaneous items required to attach materials as specified and shown on Drawings.

2.02 APPROVED MANUFACTURERS:

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. 3M Brand Fire Protection Products (800-328-1687)
2. Tremco, Inc. (800-562-2728)
3. Hilti, Inc. (800-879-6000)

2.03 INSTALLATION DETAILS: Refer to Drawings.

A. Systems shall include all necessary items for use in areas as shown on the Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:

1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

3. Remove laitance and form release agents from concrete.

B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

A. General: Comply with the "System Performance Requirements" article in Part 1 and the firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:

1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 CLEANING

A. Clean-off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

C. Promptly remove any excess materials from any exposed finish surfaces. Repair floors, walls, or other surfaces which have been stained, marred, or otherwise damaged during installation of fire barrier materials.

END OF SECTION

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Clean and Prepare Joint Surfaces
2. Sealant and Backing Materials including primers, backer rods, bond breakers and accessories.

B. Related Sections:

1. Section 04 20 00Section 04 20 00 - Unit Masonry
2. Section 05 50 00 – Metal Fabrications
3. Section 07 24 19 - Water Drainage Exterior Insulation and Finish Systems (EIFS)
4. Section 07 62 00 - Sheet Metal Flashing and Trim
5. Section 07 84 00 - Firestopping
6. Section 08 11 13 - Steel Doors and Frames
7. Section 08 14 00 - Wood and Plastic Doors
8. Section 08 41 13 - Aluminum Framed Entrances and Storefronts
9. Section 08 42 29 – Automatic Entrances
10. Section 08 51 13 - Aluminum Windows
11. Section 08 80 00 - Glazing
12. Section 09 21 16 - Gypsum Board Assemblies
13. Section 09 30 00 - Tiling
14. Section 09 72 00 - Wall Coverings
15. Section 09 90 00 - Painting

1.02 SYSTEM DESCRIPTION

A. Work shall include providing sealant at intersection of construction components within and exterior to building, including, but not limited to the following:

1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
    a. Control and expansion joints in cast-in-place concrete.
    b. Joints between architectural precast concrete units.
    c. Control and expansion joints in unit masonry.
    d. Joints in exterior insulation and finish systems (EIFS).
    e. Joints between metal panels.
    f. Joints between different materials listed above.
    g. Perimeter joints between materials listed above and frames of doors and windows.
    h. Control and expansion joints in ceiling and overhead surfaces.
    i. Under thresholds.

j. Refrigerant lines and other Div. 22/23 and 26 items entering building.

k. Joints in coping caps and exposed roof counter flashing.

l. Other joints as indicated.

2. Exterior joints in the following horizontal traffic surfaces:

a. Control, expansion, and isolation joints in cast-in-place concrete slabs.

b. Tile control and expansion joints.

c. Joints between different materials listed above.

d. Other joints as indicated.

3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

a. Control and expansion joints on exposed interior surfaces of exterior walls.

b. Perimeter joints of exterior openings where indicated.

c. Tile control and expansion joints.

d. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.

e. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.

f. Joints between plumbing fixtures and adjoining walls, floors, and counters.

g. Edge of all vinyl wallcovering installations at junctions with other materials, including ceiling joint.

h. Bottom edge of mirror channels

i. Top of tub surround

j. Other joints as indicated

4. Interior joints in the following horizontal traffic surfaces:

a. Control and expansion joints in cast-in-place concrete slabs.

b. Control and expansion joints in tile flooring.

c. Joints at countertops, vanities.

d. Under thresholds except marble.

e. Door bucks not flush with thresholds.

f. Tubs, lavatories, water closets, and other plumbing fixtures.

g. Perimeters of fixed kitchen equipment.

h. Joints of mirrors in wet areas.

i. Other joints as indicated.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Include product data, samples and manufacturer's surface preparation and installation instructions.

a. List of primers recommended for each application.

2. Submit samples of each color required for each type of joint sealer exposed to view in duplicate.

3. Certifications: Indicate compliance with standards specified in duplicate.

B. LEED Submittal:

1. Product Data for Credit EQ 4.1: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.

C. Where required by local building codes, provide certification from sealant manufacturer that sealants used in conjunction with EIFS installations is in compliance with EIFS manufacturers requirements.

1. Affidavit Form at end of this Section shall be completed by sealant applicator and submitted with EIFS warranty.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. All materials shall be verified by this Contractor to be compatible with adjacent materials.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 degrees F. and less than 100 degrees F.

2. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

1.07 WARRANTY

A. Special Warranty:

1. Submit two copies of a written guarantee agreeing to repair or replace joint sealers which fail to perform as air tight and water-tight joints; or fail in joint adhesion, cohesion, abrasion resistance weather resistance, or general durability; or appear to deteriorate or become unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship or in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. Provide one-year Warranty.

a. Defects shall include, but are not limited to:

1) Staining from abutting materials or filler.
2) Migrating, bleeding into, or staining abutting materials.
3) Unsightly surface deformation by causes other than movement.
4) Excessive color change, chalking, or dust pick-up.
5) Railing adhesively or cohesively where maximum elongation is less than 25% of designed width of exposed joints.
6) Hardening to more than 25% over specified hardness.

b. Replace sealants which fail because of loss of cohesion or adhesion or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Products listed below shall be as offered by one of the following manufacturers:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers:
   a. Dow Corning Corp. (800-248-2481)
   b. General Electric (GE) Silicones (800-255-8886)
   c. BASF Building Systems (952-496-6000)
   d. Bostik Inc. (800-523-2678)
   e. Pecora Corp. (800-523-6688)
   f. Tremco, Inc., an RPM Company (800-562-2728)

2.02 JOINT SEALANTS

A. General:

1. Colors: As shown on Interior Finish Index and Exterior Finish Index, or if not shown, match sealant material to colors of adjacent materials, as approved by Owner's representative, unless indicated otherwise.
2. Elastomeric Sealant Standard: Comply with ASTM C920 and other requirements indicated for each liquid-applied chemically curing sealant, including those referencing ASTM C920 classifications for type, grade, class, and uses.
3. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.
4. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

C. Sanitary Sealant, Interior Use:

4. One component silicone rubber sealant, complying with ASTM C920, Type S, Grade NS, for Use NT, Class 25, and FS-TT-S-001543, Class A. Provide acid cure, nonporous bond type, mildew resistant silicone rubber where both joint faces are metal, glass, plastic, tile, or other non-porous material.

5. Acceptable Products:

a. "Omni-Plus"; BASF Building Systems (952-496-6000)

b. "786 Mildew Resistant"; Dow Corning Corp. (800-248-2481)

c. "Sanitary SCS1700"; General Electric (GE) Silicones (800-255-8886)

d. "Tremsil 200 Sanitary"; Tremco, Inc., an RPM Company (800-562-2728)

e. "898"; Pecora Corp. (800-523-6688)

D. Interior Joints not subject to Movement:

1. One part, gun grade, acrylic latex meeting the requirements of ASTM C834, Type OP, Grade NF, with 10 year life expectancy.

2. Acceptable Products:

a. "Chem-Calk 600"; Bostik Inc. (800-523-2678)

b. "AC-20+"; Pecora Corp. (800-523-6688)

c. "Tremflex 834"; Tremco, Inc., an RPM Company (800-562-2728)

d. "Sonolac"; BASF Building Systems (952-496-6000)

E. Exterior joints greater than 1/2" (except E.I.F.S. areas):

1. Two-part non-sag, polyurethane type, meeting ASTM C920, Type M, Grade NS, Class 50, Use NT, with 20 year life expectancy.

2. Colors: Match sealant material to colors of adjacent materials, as selected by Owner's Representative from manufacturer's standard colors.

3. Acceptable Products:

a. "Chem-Calk 2641"; Bostik Inc. (800-523-2678)

b. "Dymeric 240 or 240FC" ; Tremco, Inc., an RPM Company (800-562-2728)

c. "Dynatrol II"; Pecora Corp. (800-523-6688)

d. "Sonolastic NP2"; BASF Building Systems (952-496-6000)

F. Exterior joints less than 1/2" (except E.I.F.S. areas):

1. One-part, non-sag acrylic Terpolymer formulation meeting the requirements of ASTM C920, Tyoe S, Grade NS, Class 25, Use FT, with 20-year life expectancy.

2. Colors: Match sealant material to colors of adjacent materials, as selected by Owner's Representative from manufacturer's standard colors.

3. Acceptable Products:

a. "Dynatrol I-XL"; Pecora Corp. (800-523-6688)

b. "Dymonic"; Tremco, Inc., an RPM Company (800-562-2728)

c. "Vulkem 116"; Tremco, Inc. , an RPM Company (800-562-2728)

d. "Sonolastic NP1"; BASF Building Systems (952-496-6000)

G. Exterior Joints at E.I.F.S. Areas:

1. The following sealant materials are known to be compatible with the exterior insulation finish system (E.I.F.S.) specified in Section 07 24 19. Product utilized shall be verified by this Contractor for approval with E.I.F.S. manufacturer utilized on this Project.

a. Tremco, Inc., an RPM Company (800-562-2728)

1) Primer: "No. P1"

2) Sealant: "Dymeric 240 or Dymeric 240FC"

b. BASF Building Systems (952-496-6000)

1) Primer: "No. 733"

2) Sealant: "Sonolastic NP 2"

c. Pecora Corp. (800-523-6688)

1) Primer: "P-75"

2) Sealant: "Dynatrol II"

H. Sealant Materials - Glazing:

1. Sealant composition shall be a silicone base, single component, solvent curing, capable of withstanding movement of up to 50 percent of joint width and shore a hardness of 26. Sealant shall conform to ASTM C920, TTS-S-001543A and TT-S-00230C (COM-NBS).

2. Acceptable Products:

a. "SILGLAZE N"; General Electric (GE) Silicones (800-255-8886)

b. "SPECTRUM 2"; Tremco, Inc., an RPM Company (800-562-2728)

2.03 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Filler Backer Rod: ASTM C1330 Type B; non-staining round, closed cell polyethylene, non-gassing rod, with surface skin, sized to produce 25% compression when installed in joint.

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. "Sonolastic Soft Backer Rod"; BASF Building Systems (952-496-6000)

b. "Sof Rod"; Nomaco Inc. (800-345-7279)

D. Bond Breaker Tape:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. Pressure Sensitive 470 or 481 Polyethylene"; 3M Adhesives, Coatings and Sealers Div., (800-328-1687)

b. Approved Substitution

E. Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

1. Provide cleaner conditioner required for glass and glazed surfaces as recommended by sealant manufacturer.

F. Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected. Beginning of Installation means acceptance of all existing conditions making this Contractor responsible for correcting all unsatisfactory and defective work encountered at his expense.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellents; water; surface dirt; and frost.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Remove laitance and form release agents from concrete.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears such as masonry or EIFS materials. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Surfaces and air temperature shall be greater than 30 degrees F and less than 100 degrees F.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on reconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

1. Ensure that primer fully covers surfaces to which sealant is to adhere.

2. Apply with bristle brush. Do not flood surfaces.

3. Allow primer to dry 30 minutes minimum or as recommended by manufacturer prior to application of backing rod and sealant.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.

2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure. Bond breaker must be used in all conditions where three-sided adhesion may be possible.

E. Install sealants by proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

4. Joint Size:

a. Depth of joint shall not exceed width of joint.

b. Minimum depth: ¼”

c. Maximum depth: ½”

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

a. Provide concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.

b. Provide flush joint configuration, per Figure 5B in ASTM C1193, where indicated.

c. Provide recessed joint configuration, per Figure 5C in ASTM C1193, of recess depth and at locations indicated.

1) Use masking tape to protect adjacent surfaces of recessed tooled joints.

2) All joints shall be free of air pockets, foreign embedded matter, ridges, and sags.

3.04 CURE:

A. Cure sealant in compliance with manufacturer's instructions and recommendations to obtain high, early bond strength, internal cohesion strength and surface durability.

3.05 CLEANING:

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur. Remove masking material immediately following sealant application.

3.06 PROTECTION:

A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage and deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

EXTERIOR SEALANT AFFIDAVIT

(ATTACH TO EIFS PROJECT WARRANTY)

Sealant Sub-Contractor Company: _____
(Type Name)

Completion Date: _____

THE SEALANT INSTALLED IN CONJUCTION WITH _____ *(Name of EIFS Mfg)* EXTERIOR INSULATION AND FINISH SYSTEM (EIFS) INSTALLED ON THE STRUCTURE BELOW LOCATED AT THE ADDRESS INDICATED BELOW:

_____ **CONFORMS** _____ **DOES NOT CONFORM**

TO: _____ *(Name of EIFS Mfg)*

AND _____ *(Sealant Mfg's. Name)*

RECOMMENDED INSTALLATION PRACTICES AND PROJECT MANUAL SECTION 07 92 00 (JOINT SEALANT SPECIFICATION)

Name & Address of Structure

Product Component Names	
Primer(s):	
Sealers:	
Bond Breakers:	
Sealant Material:	

Installation	Conforms	Does Not Conform
A. Designer's requirements, details		
B. Sealant manufacturer's details and requirements		
C. Exterior insulation details and requirements		

D. The information entered above is offered in **testimony** that the **Sealant** installation conforms with the listed sealant manufacturer's installation methods and procedures and the EIFS manufacturer's minimum recommendations..

Sealant Installer Company Name & Address:

_____

_____

_____

Signature of responsible officer: _____
Typed Name and Title of Officer: _____
Telephone Number: ( ) _____
Date Signed: _____

END OF SECTION

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior Hollow Metal Doors and Frames
2. Exterior Hollow Metal Doors and Frames

B. Related Sections:

1. Section 07 62 00 – Sheet Metal Flashings & Trim
2. Section 07 92 00 – Joint Sealants
3. Section 08 14 00 - Wood Doors
4. Section 08 71 00 - Door Hardware
5. Section 08 80 00 - Glazing
6. Section 09 90 00 - Painting

1.02 DEFINITIONS

A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.03 REFERENCES

A. SDI - Steel Door Institute Publications SDI 105 through 128

B. ANSI/SDI A250.3 "Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames"

C. ANSI/SDI A250.4 "Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings"

D. ANSI/SDI A250.6 "Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames"

E. ANSI/SDI A250.8 - SDI-100 "Recommended Specifications for Standard Steel Doors and Frames"

F. ANSI/SDI A250.10 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames"

G. ANSI/SDI A250.11 "Recommended Erection Instructions for Steel Frames (Formerly SDI-105)"

H. ANSI/DHI A115.1G "Installation Guide for Doors and Hardware"

I. ANSI/DHI Publication A115.1G

J. NFPA 80 - Standard for Fire Doors and Windows

K. NFPA 105 "Hot Smoke Test"

L. NFPA 252 “Standard Methods of Fire Tests of Door Assemblies”

M. Underwriter's Laboratories, Inc. (UL) Standards

1. UL Building Materials Directory; Underwriters Laboratories Inc.

2. UL 10B "Standard for Fire Tests of Door Assemblies"
3. UL 10C "Positive Pressure Fire Tests of Door Assemblies"
4. UL 1784 "Air Leakage Tests of Door Assemblies"
5. UL Procedure No. R-3791

N. Warnock Hersey, ETL SEMKO division of Intertek (WHI) Publications:

1. "Certification Listings"

O. National Association of Architectural Metal Manufacturers (NAAMM) Publications:

1. "Metal Finishes Manual for Architectural and Metal Products"

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance and temperature-rise ratings, and finishes for each type of steel door and frame specified.
2. Submit Shop Drawings and product data indicating pertinent dimensioning, construction, component connections and locations, anchorage methods and locations, hardware locations and installation details, and the following:
   a. Elevations of each door design.
   b. Details of doors including vertical and horizontal edge details.
   c. Frame details for each frame type including dimensioned profiles.
   d. Details and locations of reinforcement and preparations for hardware.
   e. Details of each different wall opening condition.
   f. Details of anchorages, accessories, joints, and connections.
   g. Coordination of glazing frames and stops with glass and glazing requirements.
3. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.
   a. Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.05 QUALITY ASSURANCE

A. Hollow metal doors and frames shall be fabricated in accordance with standards and specifications established by Steel Door Institute, complying with ANSI A250.8-1998 (SDI-100) “Recommended Specifications for Standard Steel Doors and Frames” and as specified.

B. Acoustical qualities: Doors shall have a minimum sound transmission classification of 29 as tested under ASTM E90-61T.

C. Fire-Rated Door Assemblies: Units that comply with NFPA 80 are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E2074, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated. Test pressure shall be tested in accordance with NFPA 252, or UL 10C to comply with local code requirements.

D. Opening assemblies shall meet the requirements of NFPA 105 Hot Smoke Test.

E. All stairwell doors and other doors as may be shown on the Drawings shall comply with the temperature-rise rating of 450 degrees F. maximum in 30 minutes of fire exposure.

F. Installer Qualifications: Installer experienced in performing work of this section who has specialized in the installation of work similar to that required for this project.

1. Certificate: When requested, submit certificate indicating qualification.

G. Inspection: General Contractor shall provide in writing to Owner an inspection of all steel doors and frames for conformance to specifications. Inspection shall include checking for fit tolerance plumb and level as well as proper hardware and operation.

1. Comply with the requirements of the International Building Code with testing in accordance with UL 10C for positive pressure door test.

a. Test Pressure: After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.

b. Doors shall be labeled to certify compliance.

c. Provide installation instructions attached to each door in a manner that assures availability to the installer and building official.

H. Fire-Rated, Borrowed Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257, or UL 9.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work cardboard wrapped or crated to provide protection during transit and job storage.

1. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

2. Deliver welded frames with two removable spreader bars across bottom of frames.

B. Label each item, before shipping, with metal or plastic tags to show their location, size, door swing, and other pertinent information.

C. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Owner's Representative. Remove and replace damaged items that cannot be repaired as directed.

D. Store doors and frames at building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Maintain environmental conditions (temperature, humidity, and ventilation) recommended by manufacturer for optimum results. Do not install products environmental conditions outside manufacturer's absolute limits.

1.08 COORDINATION

A. Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01 DISTRIBUTOR

A. Avendra, LLC Preferred Manufacturers:

1. Contract Hardware, Inc. (404-350-9408)

a. Contact: Mark Tew

2.02 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. The Steelcraft Door and Frame Products, Division of Ingersoll-Rand (800-930.8585)
2. Ceco Door Products, an ASSA ABLOY Group Company (615-661-5030)
3. Republic Builders Products, Division of MAGNATRAX Corporation (800-733-3667)
4. CURRIES Company, an ASSA ABLOY Group Company (800-377-3948)

2.03 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A1011 and A568, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A1008 and A568, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Electrolytic Zinc-Coated Steel Sheet: ASTM A591, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

D. Hot dipped zinc coated steel shall be of the alloyed type and comply with ASTM A924 and A653.

E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A153 / A153M, Class B.

F. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A153 / A153M.

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

H. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC Paint 20.

I. Hardware reinforcing on doors and frames shall comply with ANSI/SDI A250.6. The physical performance levels shall be in accordance with ANSI/SDI A250.4.

2.04 HOLLOW METAL FRAMES

A. General:

1. Fabricate steel frame units to comply with ANSI/SDI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Conceal fastenings, unless otherwise indicated.

B. Location and Type: All metal frames for doors shall be formed of steel to sizes and shapes indicated. Frames shall be fabricated with continuously welded corners unit type construction at joints. Frames shall be furnished with Underwriter's Laboratories label, as required, at the place of manufacturer.

C. Type and Gauges of Metal: Metal for frames shall be cold-rolled or hot-rolled, pickled and oiled, steel sheets with clean, smooth surfaces. Except where other gauges are indicated or specified, frames shall be fabricated from steel, not lighter than the standard Manufacturers Standard Gauge (MSG) as referenced in ANSI A250.8 :

1. Interior Frames of 16-gauge (0.053-inch) thick steel sheet for:
    a. Door openings wider than 48 inches.
    b. Level 2 steel doors.
    c. Wood doors, unless otherwise indicated.
2. Exterior Frames of 16-gauge (0.053-inch) thick steel sheet for:
    a. Door openings wider than 48 inches.
    b. Level 2 steel doors.
    c. Level 3 steel doors.
3. Exterior frames shall be 0.30 per square foot per side, hot-dipped galvanized or electrolytic zinc-coated steel with a stretcher level degree of flatness.

D. Workmanship and Design: The finished work shall be strong and rigid, neat in appearance, and free from defects. Fabricate members straight and true with corner joints well-formed, in true alignment and fastenings concealed where practicable.

E. Forming Corner Joints: Joints for welded-type frames shall be mitered and continuously arc-welded for full depth and width of frame and trim. All contact edges shall be closed tight and all welds on exposed surfaces dressed smooth and flush.

F. Provision for Hardware: Frames shall be prepared at the factory for the installation of hardware. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware, unless more stringent requirements are indicated. Welding of hinges to frames will not be permitted. Frames shall be mortised, reinforced, drilled, and tapped to templates to receive all mortised hardware. Provide cover boxes in back of all hardware cut-outs. Lock strikes shall be set out and adjusted to provide clearance for silencers.

1. Provide preparation for rubber silencers on interior room door frames; three per strike jamb at single doors.
2. Provide concealed metal reinforcements for hardware as required. The gauges of metal for reinforcement shall be in accordance with the manufacturer's recommendations for the type of hardware and the thickness and width of doors to be hung in the frame, provided that the gauges used are not lighter than those required by Commercial Standard CS-242-62.
    a. Galvanized for exterior doors unless scheduled otherwise.
3. All frames shall have a security anchor system installed on strike jamb consisting of a compression anchor at 3-1/2” from head of door frame and a “Z” type security anchor at 45” above floor.

G. Wall Anchors: Provide metal anchors of shapes and sizes required for the adjoining type of wall construction. Locate anchors on jambs near the top and bottom of each frame and at intermediate points not over 24 inches apart. Galvanized anchors for exterior frames.

1. Anchor types shall be varied to provide positive fastening to adjacent construction.

2. Provide UL approved anchors for UL labeled frames. Anchorage of UL label frames shall conform to printed UL test report for door frame manufactured.

H. Plaster Guards: Provide 0.016-inch-thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation. Required at all door strikes.

I. Floor Anchors: Provide floor clips of not less than 16-gauge steel and fasten to bottom of each jamb member for anchoring frame to floor construction. Clips shall be adjustable and drilled for 3/8" diameter anchor bolts.

J. Shipment: For welded type frames, provide temporary steel spreaders fastened across bottom of frames. Where construction will permit concealment, leave spreaders in place after installation. Otherwise, remove spreaders after frames are set and anchored. In place of spreaders, frames may be strapped together in pairs with heads inverted for bracing during shipment. Before shipping, label each frame with metal or plastic tapes to show their location, size, door swing, and other pertinent information.

1. All Exterior Door Frames, Public Space, Back-of House, and Guestroom Entry Doors shall have continuously welded corners.

2.05 FRAME INSULATION

A. Glass fiber, semi-rigid board, 2” thickness, unfaced, 3 lb. density.

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. “Type 703” - Owens-Corning Fiberglass Corp (800-438-7465)

b. Substitutions: None accepted

2.06 HOLLOW METAL DOORS

A. General:

1. Fabricate steel door units to comply with ANSI/SDI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Hollow Metal Doors:

1. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI/SDI 250.8 for level and model and ANSI/SDI A250.4 for physical-endurance level.

2. Interior Flush Door:

a. Model: “L Series”; Steelcraft Manufacturing Company, or approved substitution by other listed manufacturers.

b. Level 2, Heavy Duty, 18-gage, and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).

c. Thickness: 1-3/4”

d. Cores: Per ANSI/SDI A250.8

1) Doors shall be reinforced, stiffened, sound deadened and insulated with impregnated Kraft honeycomb core completely filling the inside of the doors and laminated to inside faces of both panels using contact adhesive applied to both panels and honeycomb core.

e. Minimum hardware reinforcing gages shall comply with Table 4 of ANSI/SDI A250.8.

3. Interior Temperature Rise Doors

a. Temperature rise doors shall be the same as flush door construction except core material shall be designed to produce the 450 degree temperature rise rating.

b. Cores: Per ANSI/SDI A250.8:

c. Mineral-Fiber Board: For labeled doors if a temperature-rise limit is required.

4. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical-endurance level:

a. Flush Door:

1) Thickness: 1-3/4”

2) Model: “L Series”; Steelcraft Manufacturing Company, or approved substitution by other listed manufacturers.

3) Level 3, Extra Heavy Duty, 16-gage, and Physical Performance Level B (Extra Heavy Duty), Model 2 (Seamless).

b. Exterior doors shall be fabricated as thermal insulating door and frame assemblies and tested in accordance with ASTM C236 or ASTM C976 on fully operable door assemblies. Provide thermal-rated assemblies with U-factor of 0.24 or better. Hot-dipped galvanized or electrolytic zinc-coated steel with a stretcher level degree of flatness.

c. All exterior swing-out doors shall have the top and bottoms closed to eliminate moisture penetration. Door tops shall no have holes or openings.

C. Door Louvers:

1. Furnish and install louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch thick, cold-rolled steel sheet set into 0.032-inch thick steel frame.

a. Provide stationary sight-proof louvers with inverted V-Shaped or Y-Shaped blades of sizes and locations as shown on the Drawings.

b. Provide Fire-Rated Automatic Louvers of sizes and locations as shown on the Drawings at fire-rated openings.

1) Louvers to be constructed with movable blades closed by actuating fusible links and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by the same testing and inspecting agency that established fire-resistance rating of door assembly.

D. Door Fabrication:

1. Fabricate doors and frames in accordance with ANSI/SDI A250.8.

2. Workmanship: The finished work shall be rigid, neat in appearance, and free from defects; form molding members straight and true with joints coped or mitered, well formed and in true alignment. All welded joints on exposed surfaces shall be dressed smooth so they are invisible after finishing.

3. Door Sizes and Clearances: Doors shall be of type, sizes, and design indicated. The clearances for doors shall be 1/8" at jambs and heads and 3/4" at bottom, unless indicated or specified otherwise. Clearances at meeting edges of pairs of doors shall be 1/4" (1/8" on fire doors).

a. Clearances for Fire-Rated Doors: As required by ANSI/NFPA 80.

4. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

5. Provisions for Hardware: Mortise, reinforce, drill, and tap doors at factory to receive all mortise-type hardware. Provide reinforcing only for doors to receive surface-applied hardware, except push plates and kick plates; drilling and tapping for surface-applied hardware will be done in the field. Provide metal reinforcing plates for surface-applied hardware as required. The gauges of metal for reinforcing plates shall comply with manufacturer's recommendation for the type of hardware used and the size and thickness of doors, provided that the minimum requirements are as follows:

   a. Hinge Reinforcement - 3/16 Inch

   b. Strike Reinforcement - 11 Gauge

   c. Closers and Bracket Reinforcement - 12 Gauge

   d. Mortise Covers - 26 Gauge

   e. The gauges used shall not be lighter than those required by Commercial Standard CS 242-62.

6. Glazing Preparation:

   a. Doors indicated to have glass shall have non-removable glazing stops on the exterior sides of the openings and removable or snap-on type stops on the inside of the openings.

   b. Provide manufacturer's vision lites of sizes and locations as shown on Drawings, recessed into the door face similar to "Dezigner Trim" by Steelcraft, or approved substitution by listed manufacturers.

   c. Stops shall be UL approved for UL labeled doors.

E. Doors with labels shall carry Underwriters label on the door and on the frame. They shall be constructed to meet Procedure No. R-3791 and R-3821, as listed by Underwriters Laboratories.

2.07 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish steel doors and frames after assembly.

B. Factory Prime Coating for Field Painted Finish: Unless specified otherwise, provide manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI/SDI A250.10 for acceptance criteria.

1. Clean and chemically treat metal surfaces to assure maximum paint adherence. Follow with a dip or spray coat of lead-free, rust-inhibitive metallic oxide, zinc chromate, or synthetic resin primer on all exposed surfaces. Finished surfaces shall be smooth and free from irregularities and rough spots.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.

3.02 GENERAL

A. Fabricate and install hollow metal units and their accessories in strict accordance with these Specifications and manufacturer's data.

B. Hardware: For installation see Division 08, "Door Hardware" Section of these Specifications.

3.03 PLACING FRAMES

A. Comply with the provisions of the "Steel Door Institute" 105, unless otherwise indicated.

B. Set frames accurately in position, plumbed, aligned, and braced until permanent anchors are set.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.

C. Frame Insulation: Install insulation in frames of gypsum board partitions. Cut insulation to full width of frame throat and friction fit within the jamb and head. Pack solid around perimeter of the frame.

D. Anchor bottom of frames to floors with expansion bolts, or with power fasteners. Build wall anchors into walls or secure to adjoining construction as indicated or specified. Where frames require ceiling struts or other structural overhead bracing, they shall be anchored securely to ceiling or structural framing above as indicated and specified.

1. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

2. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.

3. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.

E. Install fire-rated frames in accordance with NFPA Standard No. 80.

3.04 DOOR INSTALLATION

A. Door Installation: Comply with ANSI A250.8. Fit hollow metal doors accurately in their respective frames within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

B. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

C. Smoke-Control Doors: Install to comply with NFPA 105.

3.05 ADJUSTMENT

A. Check and re-adjust operating finish hardware items in hollow metal work just prior to final inspection.

B. Remove and replace defective work including doors or frames which are warped, bowed, or otherwise damaged.

C. Finished Doors: Refinish or replace doors damaged during installation.

D. Protect doors as recommended by door manufacturer to ensure that doors will be without damage or deterioration at time of Substantial Completion.

3.06 TOUCH-UP

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Repairs: Fill surface depressions with metallic paste filler, allow to cure, and sand flush for invisible joint with adjacent metal surfaces. Sand rust areas and apply touch-up paint using air drying paints compatible with shop finish. Damaged doors or frames that cannot be repaired shall be replaced.

3.07 CLEANING:

A. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

B. Upon completion, metal surfaces of doors and frames that are completely factory finished shall be thoroughly cleaned and touched-up as recommended by the door manufacturer.

END OF SECTION

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SECTION 08 14 00 - WOOD DOORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Types of doors required include the following:

a. Interior Stile and Rail Wood Doors with Wood Veneer Faces:

1) One-Panel Design with glazed laminated glass at Guestroom Bath and Toilet Sliding Doors.

b. Solid Core Wood Doors with Plastic Laminate Faces

1) Solid Core Flush Doors at Public Space Doors, Back-of-House Doors, Guestroom Entry Doors and Guestroom Connector Doors.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 06 20 00 - Finish Carpentry
3. Section 08 11 13 - Hollow Metal Doors and Frames
4. Section 08 41 13 - Aluminum Framed Entrances and Storefronts
5. Section 08 71 00 - Door Hardware
6. Section 08 80 00 - Glazing
7. Section 09 90 00 - Painting

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Door manufacturer's technical data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.
2. Shop Drawings: Submit Shop Drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.

a. Submittals shall use the same designations for door and hardware numbers as shown on the Drawings.

B. LEED Submittals:

1. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood used for stile and rail wood doors complies with forest certification requirements.

a. Include statement indicating costs for each certified wood product.

2. Product Data for Credit EQ 4.4: For adhesives and composite wood materials, documentation indicating that products contain no urea formaldehyde.

1.03 QUALITY ASSURANCE

A. Quality Standards: Comply with the following standards:

1. WDMA Quality Standard: I.S.1-A "Architectural Wood Flush Doors", and I.S.6, "Industry Standard for Wood Stile and Rail Doors" of Window and Door Manufacturers Association (WDMA)
2. AWI Quality Standard: "Architectural Woodwork Quality Standards", including Section 1300 "Architectural Flush Doors", and Section 100-S-3 "Moisture Content", of Architectural Woodwork Institute (AWI) for grade of door, core construction, finish and other requirements exceeding those of WDMA quality standard.

B. Sound Transmission Class: All entrance doors from interior corridors, together with their perimeter seals shall have a minimum Sound Transmission Class (STC) of 26.

C. Safety Glass: Provide products complying with ANSI Z97.1 and testing requirements of 16 CFR, Part 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

D. Fire-Rated Wood Doors: Provide wood doors that comply with NFPA 80, are identical in materials and construction to units tested in door and frame assemblies per ASTM E152, and which are labeled and listed for ratings indicated by UL, Warnock Hersey or other testing and inspection agency acceptable to authorities having jurisdiction.

1. Provide rated stiles on fire rated doors.
    a. Test Pressure: After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
    b. Doors shall be labeled to certify compliance.
    c. Provide installation instructions attached to each door in a manner that assures availability to the installer and building official.

E. Manufacturer: Obtain doors from one source.

F. Inspection: General Contractor shall provide in writing to Architect, an inspection of all doors and frames for conformance to specifications. Inspection shall include checking for fit tolerance, plumb and level, as well as proper hardware and operation.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations of WDMA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors", as well as with manufacturer's instructions.

1. Individually Package doors in vented poly bags with identifying marks prior to shipment. Doors shall not be removed from bags until ready to hang. After hanging, bags shall be placed over doors to provide protection until area in which doors are hung is free of construction traffic.
2. Store doors off the floor at least 3" in an area that is not susceptible to standing water or high moisture. Store doors in an upright position with spacers or corner caps separating each door.

B. Identify each door with individual opening numbers which correlate with designation system used on Shop Drawings for door, frames, and hardware, using temporary, removable or concealed markings.

1.05 PROJECT CONDITIONS

A. Conditioning: Do not deliver or install doors until building is enclosed, wet work is complete, and conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with the following requirements applicable to Project's geographical location:

1. Referenced AWI quality standard including Section 100-S-11, "Relative Humidity and Moisture Content".

1.06 SPECIAL WARRANTY

A. General: Warranties shall be in addition to and run concurrent with, and not be a limitation of, other rights the Owner may have under the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer and General Contractor, agreeing to repair or replace defective doors that have warped (bow, cup or twist) more than 1/4 inch in a 42" x 84" section, or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3 inch span, or do not conform to tolerance limitations of referenced quality standards.

1. Warranty shall also include reinstallation and finishing that may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.

2. Warranty shall be in effect during the following period after date of Substantial Completion:

a. Solid-Core Interior Doors: Life of installation.

C. Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's Warranty.

PART 2 PRODUCTS

2.01 DISTRIBUTORS

A. Avendra, LLC Preferred Distributor:

1. Contract Hardware, Inc. (800-266-3418)

a. Contact: Mark Tew

2.02 PLASTIC FACED WOOD DOORS

A. Avendra, LLC Preferred Manufacturers:

1. Flush Doors

a. None

2. Specialty Doors

B. Approved Manufacturers:

1. Flush Doors

a. VT Industries Inc. (800-827-1615)

b. Mohawk Flush Doors, Inc., a Masonite Company (570-473-3557)

c. Eggers Industries (920-793-1351)

d. Algoma Hardwoods, Inc. (800-678-8910)

e. The Maiman Company (417-862-0681)

C. Solid Core Doors for Laminate Finish: Comply with the following requirements:

1. Faces:

a. Plastic Laminate: NEMA LD-3, General Purpose 0.050 inch HPDL, Grade 50, color and pattern as shown on Interior Finish Index.

2. AWI Grade: Custom

3. Construction: 3-Ply

4. Core:

a. Solid Core Doors: Particleboard, ANSI/208.1, 1-LD-2

5. Thickness: 1-3/4"
6. Factory seal top and bottom rails.
7. Facing Adhesive: Type I - Water-proof.
8. Blocking: Provide either hardwood or structural composite lumber wood blocking in particleboard-core doors as follows:
   a. Top Rail (No Closer): Minimum 1-1/8 inch.
   b. Top Rail (Closer): Minimum 5-inch remaining after installation. Verify with closer manufacturer.
   c. Bottom Rail: Minimum 1-1/8 inch after undercut.
   d. Bottom Rail: 5-inch bottom-rail in doors indicated to have kick, mop, or armor plates.
   e. Midrail: 5-inch midrail blocking, in doors indicated to have exit devices devices at location of exit device.
9. Stiles: Hardwood or structural composite lumber, minimum 1-3/8” wide before sanding. Plastic-laminate matching faces, applied before faces.

D. Fire-Rated Solid Core Laminate Doors: Comply with the following requirements.

1. Faces: Provide faces to match non-rated doors in same area of building, unless otherwise indicated.
   a. Construction: Manufacturer's core construction as required to provide fire-resistance rating indicated.
2. Blocking: Provide either hardwood or structural composite lumber wood blocking in particleboard-core doors or as required to meet specified fire rating and as follows:
   a. Top Rail (No Closer): Minimum 1-1/8 inch.
   b. Top Rail (Closer): Minimum 5-inch remaining after installation. Verify with closer manufacturer.
   c. Bottom Rail: Minimum 1-1/8 inch after undercut.
   d. Bottom Rail: 5-inch bottom-rail in doors indicated to have kick, mop, or armor plates.
   e. Midrail: 5-inch midrail blocking, in doors indicated to have exit devices at location of exit device.
3. Stiles: Provide stiles consisting of two plys.
   a. The inner-ply shall be minimum 1-3/8 inches Structural Composite Lumber (SCL) or approved non-combustible material on 20 minute rated doors, On 45, 60, and 90 minute rated doors, the inner-ply shall be 1-inch of Structural Composite lumber or approved combustible material.
   b. Provide edge construction with intumescent seals concealed by outer stile matching plastic laminate in accordance with "Category A" Guidelines as published by ITS/Warnock Hersey, and laminated backing at hinge stiles for improved screw-holding capability and split resistance.
      1) Intumescent seals shall not be exposed on the vertical edges of the door.
      2) Surface applied intumescent seals will not be permitted on the door or frame.

2.03 INTERIOR STILE AND RAIL WOOD DOORS

A. Guestroom Toilet and Bath Sliding Wood Doors:

1. Avendra, LLC Preferred Manufacturers:
    a. None
2. Approved Manufacturers:
    a. VT Industries Inc. (800-827-1615)
        1) Single-Panel: “1000 Series, Model SS3011SHS”
    b. Eggers Industries (920-793-1351)
        1) Approved Substitution
    c. Algoma Hardwoods, Inc. (800-678-8910)
        1) Approved Substitution
    d. The Maiman Company (417-862-0681)
        1) Approved Substitution
3. Solid Stile and Rail Doors for Transparent Finish: Comply with the following requirements:
    a. Faces: Plain sliced cherry, ANSI/HPVA A Grade, pair and book-matched for uniform color and grain pattern.
    b. Outer Stile and Rail: SCL
    c. Factory Finish: WDMA TR-6. Color as shown on Interior Finish Index. Sealed top and bottom rails.
    d. Grade: WDMA I.S. 6-A, Custom
    e. Size: Size as shown on Drawings.
    f. Thickness: 1-3/4"
    g. Stile Width: 4 inch.
    h. Rails:
        1) Top Rail Width: 4 inch, unless otherwise noted.
        2) Bottom Rail Width: 10 inch, unless otherwise noted.
    i. Sticking Used with Panels: Flat sticking with a reveal on the back side of the sticking as Shown on Drawings.
4. Glazing:
    a. Laminated Glass: Factory Glazed 1/4" Decorative Laminated Glass. Refer to Section 08 80 00 for glazing specification.
    b. Mirror:
        1) Mirror Facing: Factory Glazed, Smooth-edged, silvered, mirrored, vinyl-backed safety glass complying with 16 CFR 1201 for Category II safety glass with ANSI Z97.1 test procedures; with ASTM C 1036 for Type I (transparent, flat), Class 1(clear), Quality q2 (mirror) annealed float glass; with FS DD-M-411 for coating system applied to second glass surface; and with the following:
        2) Glass Thickness: 1/8” thickness
        3) Mirror to be secured in door as recommended by door manufacturer.

2.04 LOUVERS AND LIGHT FRAMES

A. Wood Louvers (except at full louver doors): Door manufacturer's standard solid-wood louvers, unless otherwise indicated. Size as indicated on Mechanical Drawings.

B. Fire Door Louvers: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire rating of one and one-half hours and less. Size as indicated on Mechanical Drawings.

1. Metal and Finish: Galvanized steel, 0.0396 inch thick, hot-dip zinc coated and factory primed for paint finish.

C. Wood Beads for Light Openings in Wood Doors:

1. Wood Species: Same species as door faces, painted or stained to match laminate at laminate doors.

2. Profile: Flush rectangular beads.

3. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

D. Wood-Veneered Beads for Light Openings in Fire Doors: At fire-rated door locations except, 20-minute rated doors, provide manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.

E. Refer to Section 08 80 00 for glazing.

2.05 FABRICATION - GENERAL

A. Fabricate wood doors to produce doors complying with following requirements:

1. Fabricate fire rated doors in accordance with AWI Quality Standards and to UL or Warnock Hersey requirements. Attach fire rating label to door and frame.

2. Stiles, rails and core shall be fully bonded together with adhesive and sanded smooth prior to laminating of face veneer.

3. Cross bands and faces for PC and FD type doors shall be laminated to core by the hot or cold plate process.

4. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea-formaldehyde resins.

5. Factory-prefit and pre-machine doors to fit frame opening sizes indicated with the following uniform clearances and bevels:

a. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory pre-machining.

b. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

c. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

d. Factory drill pilot holes for hinge and lock face plate screws.

e. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory pre-machining.

6. Undercut:

a. Guestroom Entry Door = 1/4" above threshold.

b. Guestroom Connector = 1/2" above threshold as coordinated with door bottom. (15/16" above concrete)

c. Guest Bathroom Door = 3/8" above threshold.

d. Doors swinging over carpet = 3/4" above top of concrete subfloor.

B. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of doors required.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2. Louvers: Factory install louvers in prepared openings.

C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.

1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails.

D. Pre-Assembled Doors and Frames:

1. Coordinate with Section 08 71 00 for all hardware requirements, including installation.

2.06 FABRICATION - STILE AND RAIL WOOD DOORS

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Clearances: Provide 1/8 inch at heads. Provide 3/32 inch at jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 3/8 inch from bottom of door to top of threshold.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

a. Undercut: 1-inch above top of concrete subfloor.

B. Door shall be assembled with mortise and tenon or doweled joints.

C. Pre-machining: Pre-machine and pre-fit door for hardware specified in Section 08 71 00 - Hardware.

D. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 08 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C920. Secure glass in place with removable wood stops.

E. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine installed door frames prior to hanging door.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

2. Reject doors with defects.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Hardware: For installation see Section 08 71 00 “Door Hardware”.

B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and of referenced AWI standard and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.

C. Job-Fit Doors:

1. Field-verify dimensions of each new installed door frame; trim each door as required to properly fit each frame within specified dimensional tolerances; unequal trimming may be required.

2. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and matching.

a. Trim non-rated doors equally from both sides when fitting for width and from top and bottom when fitting for height. Do not trim more than 3/4" from each edge.

3. Fitting Clearances for Non-Rated Doors: Provide 1/8" at jambs and heads; 1/16" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.

4. Fitting Clearances for Fire-Rated Doors: Complying with NFPA 80.

5. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.

6. Bevel fire-rated doors 1/8" in 2" at lock edge, trim stiles and rails only to extent permitted by labeling agency.

D. Hang doors and adjust for proper clearances and smooth operation without binding.

1. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

2. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

E. Field-Finished Doors: Refer to the following for finishing requirements:

1. Section 09 90 00, "Painting"

2. Seal field cuts in top and bottom rails and for hardware with 2 coats of a VOC compliant paint or varnish.

3.03 ADJUSTING, CLEANING, AND PROTECTION

A. Operation: Rehang or replace doors which do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.

C. Clean door and dry wipe with a soft cloth.

D. After installation, protect doors from damage as recommended by manufacturer during subsequent construction activities. Damaged doors will be rejected and shall be replaced at no additional cost to Owner.

END OF SECTION

Revision Log

SECTION 08 15 40 - FIBERGLASS DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Types of doors required include the following:

a. Flush Doors

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 06 20 00 - Finish Carpentry
3. Section 08 11 13 – Hollow Metal Doors and Frames
4. Section 08 41 13 – Aluminum Framed Entrances and Storefronts
5. Section 08 71 00 - Door Hardware
6. Section 08 80 00 - Glazing
7. Section 09 90 00 - Painting

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Door manufacturer's technical data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.
2. Shop Drawings: Submit Shop Drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.

a. Submittals shall use the same designations for door and hardware numbers as shown on the Drawings.

1.03 QUALITY ASSURANCE

A. Quality Standards: Comply with the following standards:

1. Install door and panel assembly conforming to NFPA 80 for fire-rated class, ANSI A117.1 specifications for handicap accessibility, ADA requirements, ANSI A151.1 Mod. swing cycle test in excess of 1,000,000 cycles.
2. Flame Spread: All FRP component parts, including the gelcoat finish, shall have a flame spread classification of 25 or less per ASTM E84 and shall be self extinguishing per ASTM D635 unless operating conditions dictate otherwise.
3. Resins: Resins to meet with USDA and FDA standards for incidental food contact, if applicable to this project.

B. Test Results:

1. Completed Assemblies: Conform to ANSI A151.1 Mod. Swing Cycle test in excess of 1,000,000 cycles, with no failure of any design features of the door.

C. Test Results: Manufacturer: Obtain doors from one source.

D. Inspection: General Contractor shall provide in writing to Architect, an inspection of all doors and frames for conformance to specifications. Inspection shall include checking for fit tolerance, plumb and level, as well as proper hardware and operation.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Conform to manufacturer's standard precautions. Include the following:

1. Deliver, handle and store doors and frames at the job site in such a manner as to prevent damage.

2. Do not receive doors before the building is enclosed.

3. Only remove cartons upon arrival of doors at job site if cartons are wet or damaged.

4. Store doors out of weather and/or extreme temperatures.

5. Store doors in a vertical position on blocking, clear of the floor and with blocking between the doors to permit air circulation between the doors.

6. Immediately remove all damaged or otherwise unsuitable doors and frames from the job site

B. Identify each door with individual opening numbers which correlate with designation system used on Shop Drawings for door, frames, and hardware, using temporary, removable or concealed markings.

1.05 PROJECT CONDITIONS

1. Conditioning: Do not deliver or install doors until building is enclosed, wet work is complete, and conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period.

1.06 SPECIAL WARRANTY

A. General: Warranties shall be in addition to and run concurrent with, and not be a limitation of, other rights the Owner may have under the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer and General Contractor, agreeing to repair or replace defective doors that have warped (bow, cup or twist) more than 1/4 inch in a 42" x 84" section, or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3 inch span, or do not conform to tolerance limitations of referenced quality standards.

1. Warranty shall also include reinstallation and finishing that may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.

2. Warranty shall be in effect during the following period after date of Substantial Completion:

a. 10 year warranty

C. Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's Warranty.

PART 2 PROUCTS

2.01 DISTRIBUTORS

A. Avendra, LLC Preferred Distributor:

a. None

2.02 DOORS

A. Avendra, LLC Preferred Manufacturers:

1. Flush Doors

a. None

B. Approved Manufacturers:

1. Flush Doors

a. Corrim Company (920-231-2000)

b. Special-Lite, Inc. (800-821-6531)

c. Capital Aluminum & Glass, FRP (800-331-8268)

d. Simon Door Company, LLC (866-894-7511)

C. Door Fabrication FRP (Fiberglass Reinforced Plastic) Face Sheets: Comply with the following requirements:

1. Faces:

a. Manufactured using a corrosion resistant resin system with light stabilizing additives; reinforced with fiberglass, 40% by weight.

b. Face Sheet Thickness: 0.070" to 0.125". Standard being 0.120".

c. Door thickness: Nominal 1-3/4".

d. Finish:

1) Color: As selected by Architect.
2) Special gelcoat color to be selected by the architect
3) 15 mils thick coverage, ±3 mils.
4) Smooth, seamless finish

D. Internal Construction

1. Core - Non-Fire Rated Doors: Phenolic impregnated resin honeycomb.

2. Stiles and Rails: 1-1/2" square fiberglass tubes. Provide manufacturer's standard reinforcements and corner blocks, etc. Bottom rail shall allow 1-1/4" inches of height sizing without loss of panel integrity. No metal or wood lumber reinforcements will be allowed.

E. Hardware Preparations

1. Reinforcement Blocking

a. Lockset: Non-swelling polymer blocking
b. Surface mounted hardware: Non-swelling polymer blocking
c. Thru-bolted hardware: Non-swelling polymer blocking

2. Mortise Hardware

a. Full mortise hinges: Non-swelling polymer blocking

b. Mortise locksets: To suit template provided under Section 08710.

c. Exit devices: To suit template provided under Section 08710.
d. Provide all doors mortised and reinforced to allow application of hinges and locks, in accordance with hardware schedule and manufacturer's templates. Attach hinges with stainless steel wood screws. Drill pilot holes in accordance to manufacturer's recommendations.

F. Door Accessories

1. Glazing: Provide glass support structures that ensure that the glass area is weathersealed as not to permit moisture to enter the core of the door. Glazing must allow for ready access for repair, in the event of damage or replacement, without affecting the sealed integrity of the cutout in the door panel itself. Openings cut directly into the core material will not be allowed.
2. Louver: Fabricated of FRP material of an inverted "V" design; be subject to the same performance guarantee as the door panel. Fabricate louver opening in the same method as for glazing above.
3. Fasteners: Provide stainless steel fasteners as required for glazing openings and louvers.
4. Transoms: All transom panels will be identical to the doors in construction, materials, thickness, color and reinforcement.
5. Astragals: Fabricated of FRP material of manufacturer's standard flat design.

2.03 FRAMES

A. Avendra, LLC Preferred Manufacturers:

1. Flush Doors
   a. None

B. Approved Manufacturers:

1. Flush Doors
   a. Corrim Company (920-231-2000)
   b. Special-Lite, Inc. (800-821-6531)
   c. Capital Aluminum & Glass, FRP (800-331-8268)
   d. Simon Door Company, LLC (866-894-7511)

C. Frame Fabrication FRP (Fiberglass Reinforced Plastic): Comply with the following requirements:

1. Jamb Depth: As indicated on drawings.
2. Face Dimension: 2" standard. Headers available in 2" and 4".
3. Return: 7/16"
4. Stop: 5/8".
5. Rabbet: 1-15/16"
6. Corner Miter: Head and Jamb members shall be standard 45 degree miter, providing a neatly mitered corner connection, fabricated for Knocked Down (KD) field assembly.
7. Pultrusion: In compliance with pultrusion industry standards

D. Reinforcements and Braces/Supports

1. Corner Reinforcement: 4" x 4" x 5-3/8" x 1/4" thick pultruded fiberglass angle. Attached to head bar at factory using stainless steel screws or suitable polymer rivets.

2. Mortise Hinge Reinforcement: 1-1/2" x 7" x 1/4" thick polymer. Attached to frame by means of bonding and stainless steel countersunk screws.
3. Closer Reinforcement: Same as mortise hinge reinforcement, less screws.
4. Strike Reinforcement: 1-1/2" x 9" x 3/4" thick polymer material. Attached to frame by means of bonding and stainless steel countersunk screws or suitable polymer rivets.

E. Anchoring Systems
1. "T"-Strap or Wire Anchor for masonry construction
2. Concealed existing wall anchor if necessary

F. Finish: Gelcoat; 15 mils thick, ±3 mils on all exposed surfaces. Color to match door unless otherwise indicated.

2.04 FABRICATION

A. Fabricate FRP doors and frames as shown on the drawings. Provide frames rigid, neat in appearance and free from defects. Take field measurements as required for coordination with adjoining work.

B. Form exposed surfaces free from warp, wave and buckle, with all corners square, unless otherwise shown. Set each member in proper alignment and relationship to other members with all surfaces straight and in a true plane.

C. Reinforce members and joints with plates, tubes or angles for rigidity and strength.

D. Mortise and reinforce doors and frames for hardware in accordance with the hardware manufacturer's instructions and templates. Design reinforcing to receive hinges, locks, strikes, closures, etc.

E. Provide mortar guard boxes for hardware cutouts in frames.

F. Provide at least three (3) metal anchors or polymer spacers in each jamb of frames up to 84" high and one (1) additional anchor for each 24" in height above 84", in shapes, sizes and spacing shown or required for anchorage into adjoining wall construction. Fabricate joint anchor of stainless steel.

G. Terminate bottom of frames at the indicated finished floor level.

H. Provide clearance for doors of 1/8" at jambs and heads; 1/4" clearance above threshold.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine installed door frames prior to hanging door.
1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
2. Reject doors with defects.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:

1. Install FRP doors, frames and accessories in accordance with final shop drawings and as herein specified. Installation to be similar to that of hollow metal doors and frames, and in accordance with FRP manufacturer's written instructions.

B. Frame Installation:

1. Place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged. Frame must not be drilled for brace supports.

2. In masonry construction, locate three (3) wall anchors per jamb at hinge and strike levels. Frames may be grouted full of mortar at jambs and anchors shall be built into the joints as walls are laid up. A continuous bead of silicone sealant is to be applied between the head and jamb at the miter joint.

C. Door Installation: Fit FRP doors accurately in frames, within clearances specified.

3.03 TOLERANCES

A. Maximum Diagonal Distortion: 1/8" measured with a straight edge, corner to corner. Maximum measurable plane is 4'-0" x 7'-0".

3.04 ADJUSTING, CLEANING, AND PROTECTION

A. Operation: Rehang or replace doors which do not swing or operate freely.

B. Clean door and dry wipe with a soft cloth.

C. After installation, protect doors from damage as recommended by manufacturer during subsequent construction activities. Damaged doors will be rejected and shall be replaced at no additional cost to Owner.

END OF SECTION

Revision Log

SECTION 08 31 00 - ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Access Doors and Frames of the Following Types:

a. Wall Access Doors

b. Moisture Resistant Access Doors

c. Ceiling Access Doors

d. Floor/Ceiling System Access Doors

e. Sprinkler System Access Doors

B. Related Sections:

1. Section 09 21 16 - Gypsum Board Assemblies

2. Section 09 90 00 - Painting

3. Division 21, 22 and 23 Sections for coordination of access to valves and other concealed items.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00.

B. Shop Drawings and Samples:

1. Submit copies of Shop Drawings of all items specified herein to Architect for approval. Obtain approval of Drawings prior to proceeding with manufacturing. Shop Drawings shall indicate: Elevations of each door type; Details of each frame type; Location in the building for each item; Conditions at openings with various wall thicknesses and material; Typical and special details of construction; Methods of assembling sections; Locations and installation requirements for hardware; Size, shape, and thickness of materials; Joints and connections.

1.03 QUALITY ASSURANCE

A. Access doors shall be fabricated in accordance with standards and specifications established by Steel Door Institute.

B. Fire Rated Access Doors and Frames: Comply with NFPA 80. Provide products listed by UL or another testing agency acceptable to local jurisdictions on each fire rated access door. Provide UL Label on each fire rated access door.

C. Access panels shall be flush with finished wall or ceilings, except where panels are located in acoustic tile or paneling, the door shall be recessed to receive adjacent finish material.

D. Access panel finishes shall be coordinated with the finish treatment of the area.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver access doors cartooned or crated to provide protection during transit and job storage.

PART 2 PRODUCTS

2.01 SHOP PAINTING:

A. Apply a primed finish to all ferrous metal surfaces furnished under this Section. Clean and chemically treat metal surfaces to assure maximum paint adherence. Follow with a dip or spray coat of rust-inhibitive metallic oxide, zinc chromate, or synthetic resin primer on all exposed surfaces. Finished surfaces shall be smooth and free from irregularities and rough spots. Each coat of paint shall be separately baked or oven dried. The time and temperature for drying shall be in accordance with manufacturer's recommendations for developing maximum hardness and resistance to abrasion.

2.02 ACCESS UNITS

A. Wall Access Doors (Non-rated):

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. "WB Series"; J.L. Industries (800-554-6077)

b. "Type RDW"; Karp Associates, Inc. (800-888-4212)

c. "Model NW Series"; Nystrom Building Products (800-547-2635)

d. "Style DW"; Milcor, Inc., a brand of Commercial Products Group of Hart & Cooley, Inc. (800-624-8642)

3. Door Size: Select from manufacturer's standard sizes to suit required opening.

4. Designed for flush installation in wall construction. Construct of metal with concealed continuous hinge, having recessed screwdriver latch, size as indicated.

B. Wall Access Doors (Fire-Rated):

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. "FDWB Series"; J.L. Industries (800-554-6077)

b. "Type KRP-450 FR"; Karp Associates, Inc. (800-888-4212)

c. "IW Model Series"; Nystrom Building Products (800-547-2635)

3. Door Size: Select from manufacturer's standard sizes to suit required opening.

4. Fire Rating: 1 hour labeled.

C. Moisture Resistant Access Doors (Non-rated):

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. Larsen "L-MPSS" stainless steel frame and "L-MPSS" stainless steel door, by Larsen's Manufacturing Co, with continuous, offset and concealed hinge, security fastener. (800-527-7367)

D. Ceiling Access Doors (Non-rated):

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. “Model RDW”; Karp Associates, Inc.. (800-888-4212)

b. "Style DW"; Milcor, Inc., a brand of Commercial Products Group of Hart & Cooley, Inc. (800-624-8642)

c. Model WB-DW; Williams Brothers Corporation of America (800-255-5515)

d. “WB Series”; J.L. Industries (800-554-6077)

e. “NW Series”; Nystrom Building Products (800-447-2635)

3. Performance Criteria

a. Door Size: Select from manufacturer’s standard sizes to suit required opening.

b. Sheet metal construction with concealed continuous hinge, flush design. Provide each door with self-closing mechanism and standard flush design “self-latching” latch.

E. Ceiling Access Doors (Fire-Rated):

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. “Model KRP-350FR”; Karp Associates, Inc. (800-888-4212)

b. "Model WB-FRC"; Williams Brothers Corporation of America (800-255-3515)

c. "FDWB Series”; J.L. Industries (800-554-6077)

d. "IW Series”; Nystrom Building Products (800-447-2635)

3. Performance Criteria:

a. Door Size: Select from manufacturer’s standard sizes to suit required opening.

b. Fire Rating: 1 hour labeled.

c. Sheet metal construction with concealed continuous hinge, flush design. Provide each door with self-closing mechanism and standard flush design “self-latching” latch.

F. Floor/Ceiling System Access Doors (Fire Rated)

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. “Model 3210”; Milcor, Inc., a brand of Commercial Products Group of Hart & Cooley, Inc. (800-624-8642)

b. Approved substitution by Williams Brothers Corporation of America

c. Approved substitution by J.L. Industries (800-554-6077)

d. Approved substitution by Nystrom Building Products (800-447-2635)

e. Approved Substitution by Karp Associates, Inc. (800-888-4212)

3. Performance Criteria:

a. Size: Select from manufacturer's standard sizes to suit required opening.

b. Fire Rating: 1 hour labeled.

c. Sheet metal construction with concealed continuous hinge, flush design. Provide each door with self-closing mechanism and standard flush design "self-latching" latch.

d. Finish: Bonderized galvanized steel.

G. Sprinkler System Access Doors (Fire-rated)

1. Performance Criteria:

a. UL B (1-1/2 hr.) rated with automatic closer, UL rated anchors for construction in which door will be installed, and lockset with knob released keyed as directed by Owner.

2. Avendra, LLC Preferred Manufacturers:

a. None

3. Approved Manufacturers:

a. Milcor, Inc., a brand of Commercial Products Group of Hart & Cooley, Inc. (800-624-8642)

b. Karp Associates, Inc. (718-784-2105)

c. Williams Brothers Corporation of America (309-796-2371)

2.03 FINISHES

A. Base Metal Protection: Factory prime coat units with electrostatic baked on electrostatic powder. Prime exposed edges with coat of white rust-inhibitive paint.

1. For steel finishes comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products".

B. For fire-rated access doors, furnish units with ceramic fiberboard panel insert, attach to outside face of door, ready for field painting.

PART 3 EXECUTION

3.01 GENERAL

A. Verify rough openings for door and frame are correctly sized and located.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install units and their accessories in accordance with final Shop Drawings, manufacturer's data, and as herein specified.

B. Install frame plumb and level in wall and ceiling openings. Position to provide convenient access to concealed work requiring access. Secure rigidly in place.

3.03 ADJUSTMENT

A. Check and readjust operating finish hardware items in work just prior to final inspection.

B. Remove and replace defective work including doors or frames which are warped, bowed, or otherwise damaged.

3.04 TOUCH-UP

A. Immediately after erection of work, sand smooth any rusted or damaged areas of prime coat and touch-up of compatible air drying primer.

3.05 PROTECTION:

A. Protect doors and frames from damage during transportation and at the job site; store at the site under cover on wood blocking or on suitable floors. After installation, protect doors and frames from damage during subsequent construction activities. Damaged work will be rejected and shall be replaced with new work. Factory enameled finished work shall be shipped in cartons or other suitable containers.

3.06 CLEANING:

A. Upon completion, metal surfaces of doors and frames that are completely factory finished shall be thoroughly cleaned and touched-up as recommended by the door manufacturer.

END OF SECTION

Revision Log

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and Exterior Aluminum Storefront Framing, Doors, Door Frames, Lights, and Fixed Windows.
2. Anchors, Brackets, and Attachments
3. Door Hardware
4. Perimeter Sealant

B. Work Installed but Furnished Under Other Sections:

1. Section 08 71 00 - Door Hardware: Additional Door hardware items other than specified in this Section, and keying requirements.

C. Related Sections:

1. Section 07 92 00 - Joint Sealants
2. Section 08 51 13 - Aluminum Windows
3. Section 08 71 00 - Door Hardware
4. Section 08 80 00 - Glazing

1.02 REFERENCES

A. AAMA 10 "Care and Handling of Architectural Aluminum from Shop to Site"

B. AAMA 609 / 610-02 "Cleaning and Maintenance Guide for Architecturally Finished Aluminum"

C. AAMA 2603 "Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels"

D. ANSI/AAMA 101 "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors"

E. ASTM A36 - “Standard Specification for Carbon Structural Steel”

F. ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products

G. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality

H. ASTM B221 - "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes"

I. ASTM E283 - “Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen”

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit Shop Drawings and product data and manufacturer's installation instructions. Include system and component dimensions; components within assembly; framed

opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

B. LEED Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating 20 % percentage by weight of postconsumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit EQ 4.1: For glazing sealants and adhesives used inside of the building envelope, including printed statement of VOC content.

1.04 QUALITY ASSURANCE

A. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 degrees F. without causing detrimental effects to system or components.

B. Design for windload of 30 PSF with maximum deflection in both vertical and horizontal mullions not to exceed 1/175 of span.

C. Comply with the applicable standards of ANSI/AAMA 101 and the following:

1. AAMA Publication #10 - Care and Handling of Architectural Aluminum from Shop to Site.

2. AAMA 603.8 - Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.

3. AAMA 610.1 - Voluntary Guide Specifications for Cleaning and Maintenance of Painted Aluminum Extrusions and Curtain Wall Panels.

D. Certify that the proposed products have been tested to the following performance standards at an Independent Testing Laboratory accredited by AAMA and using the referenced ASTM standards:

1. Water Penetration: ASTM E331 no water penetration at a test pressure of 6.24 PSF.

2. Structural Properties: 30 PSF acting inward and outward per ASTM E330. Deflection not to exceed 1/175 of span.

3. Air Leakage per ASTM E283:

a. Fixed window walls - maximum of 0.06 CFM per sq. ft. of total exterior surface areas.

4. Thermal Performance: Composite glass wall shall meet or exceed the "U" value shown on the Drawings and as tested per ASTM E 236.

E. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.

F. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Transportation and Handling: Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry. Provide equipment and personnel to handle products by method to prevent soiling or damage. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

B. Storage and Protection: Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

1.06 SPECIAL WARRANTY

A. The work of this Section shall be jointly guaranteed by the manufacturer for a period of five (5) years after the date of Substantial Completion.

B. All materials shall be free from manufacturing defects and defects in installation workmanship. Any material or workmanship judged defective during this period shall be removed and replaced at no cost to the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. For purpose of designating design and quality of aluminum storefront system, fixed window system, Drawings and Specifications are based on the following:

1. Storefront and Fixed Window Framing System: 1” Insulated Glazing (Tempered)

a. Avendra, LLC Preferred Manufacturers:

1) None

b. Approved Manufacturers:

1) "Trifab VersaGlaze 451T ", Kawneer North America, an Alcoa Company. (770-449-5555)

2) "Multiplane Series 3000S", Oldcastle Glass Vistawall (800-869-4567)

3) "Series TR-7850 Multi-Glaze Storefront System "; Traco Commercial Group (800-837-7002)

4) Equal Manufacturers: As Approved.

2. Entry Doors:

a. Style and rail tubular member door framing system by same manufacturer of storefront framing system, compatible with specified framing system.

b. Style: Wide style, as indicated on Drawings.

c. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

d. Provide non-removable glazing stops on outside of door.

3. Interior Storefront and Fixed Window Framing System: 1/4” Glazing (Tempered)

a. Avendra, LLC Preferred Manufacturers:

1) None

b. Approved Manufacturers:

1) "Trifab VersaGlaze 450", Kawneer North America, an Alcoa Company. (770-449-5555)

2) "Multiplane Series 2000", Oldcastle Glass Vistawall (800-869-4567)

3) "Series TR-7855 Multi-Glaze Storefront System "; Traco Commercial Group (800-837-7002)

4) Equal Manufacturers: As Approved.

2.02 MATERIALS

A. All framing members shall be extruded aluminum of 6063T-5 alloy and shall be of the size, shape, and intended function as shown on the Drawings. Performance requirements shall conform to standards established by the Architect in relation to wind load and deflection limits.

B. Fasteners: Stainless Steel

2.03 FINISH:

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes

B. All exposed aluminum surfaces shall have a manufactured-applied, 20-year warrantied, Kynar 500 fluorocarbon finish, free from blemishes and surface defects.

C. Color: Refer to Exterior Finish Index

2.04 FABRICATION

A. Aluminum door shall have tight hairline joints where rails are fitted against stiles and shall be fastened by means of tensioned steel tie rods in top and bottom rails. Doors shall have an adjusting mechanism in the toprail to provide for minor clearance adjustments. Glass stops shall be snap-in type with bulb type glazing strips. Weather stripping shall be pile.

B. Store front sections shall be square cut and assembled with the proper clips and screws as provided by the manufacturer to form neat hairline joints. All fastenings shall be concealed except those specifically detailed by the Architect at certain transition areas. All glazing gaskets shall be cut over length and installed in slight linear compression to prevent shrinkage from the corners. All framing shall be erected square and true into correct size rough openings prepared by others and in strict accord with the Architectural Drawings.

C. Doors: Reinforce doors as required for installing hardware, including electronic strikes and card readers.

1. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.

2. At exterior doors, provide weather sweeps applied to door bottoms.

D. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

2.05 HARDWARE

A. Entrance door hardware shall be supplied with doors as follows, unless indicated otherwise:

1. Continuous Hinges, 780-112 HD, Hager, Kynar finish, color to match door.

2. Pull, Style CO-9 by Kawneer, or approved substitution by other listed manufacturer, No. 26 Finish.

3. Push, Style “CP-II” by Kawneer, or approved substitution by other listed manufacturer, No. 26 Finish.

4. Closers, surface mounted type, LCN 4040/4041 “SUPER SMOOTHEE”, cover to be STAT.

5. Weather Stripping (3 sides)

6. Bottom Sweep

7. Handicapped Threshold, clear aluminum mill finish.

8. Provide construction cylinder and replace with final cylinder specified in Section 08 71 00.

9. Final cylinders, panic devices, electric strikes and card readers by Section 08 71 00

2.06 JOINT SEALANTS

A. For metal to metal joints use Standard Products Company Stan Pro Urethane Epoxy Sealant No. 103, Dow Corning Silicone Rubber Sealant, or other as acceptable to Architect, color to match finish of aluminum to which applied.

B. For perimeter of framing members, refer to Section 07 92 00 - Joint Sealants.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install doors, frames, glazing and hardware in accordance with manufacturer's instructions.

B. Use anchorage devices to securely attach frame assembly to structure.

C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

D. Coordinate attachment and seal of air and vapor barrier materials. Install sill flashings where required.

E. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious, stone or other dissimilar materials.

F. Install glass and infill panels in accordance with Section 08 80 00 using exterior wet method of glazing.

G. Install perimeter non-hardening, non-skinning type sealant, and installation requirements in accordance with Section 07 92 00.

H. Adjust operating hardware

3.03 TOLERANCES

A. Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.

B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.04 CLEANING

A. Remove protective material from prefinished aluminum surfaces.

B. Wash-down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

Revision Log

SECTION 08 42 29 - AUTOMATIC ENTRANCES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Bi-parting Sliding Unit, with Fixed Sidelites

B. Related Sections:

1. Section 07 92 00 - Joint Sealants
2. Section 08 41 13 - Aluminum Entrances and Storefront
3. Section 08 71 00 - Door Hardware
4. Section 08 80 00 - Glazing
5. Division 26 - Electrical: Wiring

1.02 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing.

1.03 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:

1. Thermal Movements: Provide automatic entrance doors that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

a. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2. Operating Temperature Range: Provide automatic entrance door operators capable of operating between minus 30 deg F and plus 120 deg F.

3. Structural Performance: Provide automatic entrance doors capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

a. Basic Wind Speed: As indicated in miles per hour (meters per second) at 33 feet (10 m) above grade. Determine wind loads and resulting design pressures applicable to Project according to the following, based on mean roof heights above grade as indicated on Drawings:

1) Wind Loads: ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure."

4. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. of door area when tested at an inward pressure differential of 1.57 lb/sq. ft. according to ASTM E283.

5. Opening Force: Maximum opening force of 5 lbf in accordance with Americans with Disabilities Act (ADA) and local codes. Not more than 50 lbf required to manually set door in motion of power fails, and not more than 15 lbf required to open door to minimum required width..

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic entrance doors.

2. Product Certificates: Signed by manufacturers of automatic entrance doors certifying that products furnished comply with emergency exit door requirements.

3. Maintenance Data: For door operators and control systems to include in maintenance manuals specified in Division 01. Include instructions on how to perform safety tests, and the name, address, and telephone number of nearest authorized service representative.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

2. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the automatic entrance door manufacturer for both installation and maintenance of units required for this Project.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

B. Source Limitations: Obtain automatic entrance doors through one source from a single manufacturer.

C. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

D. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."

E. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify automatic entrance door openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.07 COORDINATION

A. Coordinate size and location of recesses in concrete floors for recessed sliding tracks. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

B. Electrical System Rough-In: Coordinate layout and installation of automatic entrance door assemblies with connections to power supplies and security access control system.

1.08 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of the automatic entrance door system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Lateral deflection of glass lite edges in excess of 1/175 of their length or 3/4 inch, whichever is less.
2. Excessive air leakage.
3. Faulty operation of operators and hardware.
4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty Period: Two years from date of Substantial Completion.

1.09 MAINTENANCE SERVICE

A. Maintenance: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of automatic entrance door Installer. Include bi-annual planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. "Unislide OHC Series Bi-Parting" Besam, An Assa Abloy Group Company (866-237-2687)
   a. Exterior: "Unislide OC-S"
   b. Interior: "Unislide OC-A" with Access Control Package

B. Approved Manufacturers:

1. “Dura-Glide, Series 2000, Bi-Parting”; Stanley Access Technologies, Division of The Stanley Works, (860-677-2861)
   a. Exterior: “Model 7-2260”
   b. Interior: “Model 7-2260”
2. "Series 2003 Belt Drive, Bi-Parting"; Horton Automatics, Division of Overhead Door Corporation (800-531-3111)
   a. Exterior: "Type 310, Model O-X-X-O"
   b. Interior: "Type 310, Model O-X-X-O"

2.02 AUTOMATIC SLIDING ENTRANCE SYSTEM

A. System shall consist of sliding aluminum doors and sidelights, header, operator, cylinders, actuating controls, and directional motion sensors.

1. Exterior: Model as shown above with half-beveled threshold.

2. Interior: Model as shown above with electronic access control fail secure lock, panic exit devise on active door leaves and surface mounted threshold. Provide manufacturer's standard switch to allow an exit only "night-time" mode to engage the electronic access lock system.

B. Automatic Sliding Door System: The system shall consist of sliding aluminum doors, sidelights, header, operator, and actuating controls. All components shall be factory assembled in the header, adjusted and tested.

C. Sliding Aluminum Doors: Provide door units to dimension heights and widths with corresponding glazing as shown on Drawings with standard narrow stile. Door holders shall be provided for all panels to control the doors as they swing in the direction of egress. All door panels shall have security glass stops. All doors shall have intermediate rails. The bi-part sliding door system shall include a two-point lock securing the lead edges of the door stiles together and to the hanger assembly.

D. Door Operation: Shall be bi-parting directional operation for doors #6, #7, #39 and #43. In compliance with NFPA 101, the sliding door panels shall allow “breakout” to the full open position to provide instant egress at any point in the door’s movement. To allow safe egress, automatic operation shall be discontinued when the sliding panel is in the “breakout” mode. Doors and sidelights shall be sized to prevent pinch points at meeting stiles.

1. Safety Search Circuitry: Shall be provided which will recycle the doors when an object is encountered during the closing cycle. The circuitry shall search for that object on the next closing cycle by reducing the door speed at the position the object was previously encountered, and will continue to close in check speed until the doors are fully closed, at which time the doors will reset to normal speed. If the obstruction is encountered again, the doors shall come to a full stop. The door shall remain stopped until the obstruction is removed and an operate signal is given, resetting the door to its normal speed.

2. The doors shall be provided with a "Fail-Secure Electric Carriage Lock" in the header to prevent the doors from sliding in the night mode. This device shall not interfere with emergency breakout function.

E. The doorway presence-sensing device shall be the "BEA Wizard Threshold" by Besam, “STAN-GUARD Threshold Sensor” by Stanley, or "Optional Sensor with added threshold scan", by Horton. The sensor shall be factory-installed to the underside of the header. The interior door sensing device shall be disabled (night mode) by a key switch furnished by others and installed by Division 08 71 00.

F. Interior Door to be activated during night-mode by remote card reader or push button override located at the front desk furnished by Others. Refer to Section 08 71 00.

G. Glazing: Refer to Section 08 80 00. Match adjacent storefront system

2.03 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

2. Sheet and Plate: ASTM B209.

3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Sealants and Joint Fillers: Refer to Section 07 92 00 – Joint Sealants.

C. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil thickness per coat.

2.04 COMPONENTS

A. Framing Members: Manufacturer's standard extruded aluminum, minimum 0.125 inch thick and reinforced as required to support imposed loads.

B. Stile and Rail Doors: Manufacturer's standard 1-3/4-inch-thick glazed doors with minimum 0.125-inch-thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie-rods that span full length of top and bottom rails.

C. Sidelites: Manufacturer's standard 1-3/4-inch-deep sidelites with minimum 0.125-inch-thick, extruded-aluminum tubular stile and rail members matching door design.

D. Headers: Fabricated from minimum 0.125-inch-thick extruded aluminum and extending full width of automatic entrance door units to conceal door operators, carrier assemblies, and roller tracks. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

E. Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.

F. Threshold: Manufacturer's standard threshold members and bottom-guide track system, with stainless-steel ball-bearing-center roller wheels. Interior vestibule doors #6 and #7 are not to receive thresholds.

G. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

H. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

I. Emergency Breakaway Sign: BHMA A156.10; red background with 1-inch high contrasting letters with the words "IN EMERGENCY PUSH TO OPEN."

2.05 FABRICATION

A. General: Fabricate automatic entrance door system components to designs, sizes, and thicknesses specified and to comply with indicated standards.

B. Prefabrication: Provide automatic entrance doors as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.

2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.

3. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

4. Prepare components to receive concealed fasteners and anchor and connection devices.

5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

2.06 FINISHES

A. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

2. Color: As shown on Exterior Finish Index.

PART 3 EXECUTION

3.01 INSPECTION

A. The automatic entrance door installer must examine the areas and conditions under which the automatic entrances are to be installed and notify the General Contractor in writing of conditions detrimental to the proper functioning of the entrance and the timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 INSTALLATION

A. Comply with manufacturer's specifications and recommendations. Set units plumb, level, and true. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

B. Sealants:

1. Set framing members, thresholds, bottom-guide track system, and flashings in full sealant bed.

2. Seal perimeter of framing members with sealant.

3.03 ADJUST AND CLEAN

A. After repeated operation of completed installation, readjust door operators and controls for optimum operating condition and safety. Clean glass and aluminum surfaces promptly after installation. Advise General Contractor of protective treatment and other precautions required through the remainder of the construction period to ensure that automatic entrances will be without damage or deterioration (other than normal weathering) at the time of acceptance.

B. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.

END OF SECTION

Revision Log

SECTION 08 45 00 - TRANSLUCENT ROOF PANELS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Exterior translucent panel assembly.
2. System gutter and downspout.
3. Structural design of system above the steel primary structure.

B. Related Sections:
1. Structural Steel: Section 05 12 00.
2. Flashing and Sheet Metal: Section 07 62 00.
3. Sealants: Section 07 92 00.

1.02 REFERENCE STANDARDS

A. Aluminum Association (AA):

Specifications for Aluminum Structures

B. American Society of Civil Engineers (ASCE):

ASCE 7-93 Minimum Design Loads for Buildings and Other Structures.

C. American Society for Testing and Materials (ASTM):

A 36-96 A 36-94 Structural Steel.

B 209-95 Aluminum and Aluminum-Alloy Sheet and Plate.

B 221-96 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes, and Tubes.

D 1002-94 Test Method for Strength Properties of Adhesives in Shear by Tension Loading. (Metal to Metal).

E 84-98 Test Method for Surface Burning Characteristics of Building Materials.

E 331-96 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and doors by Uniform Static Air Pressure Difference.

D. Industrial Fasteners Institute (IFI):

Handbook on Bolt, Nut and Rivet Standards.

E. OBC Building Code latest edition.

1.03 DESIGN

A. Configurations:
1. Translucent panel assembly over sloped structure.

B. Framing:
1. Structural Steel framing provided as work of Section 05 21 00.
2. Concealed exterior and interior fasteners.

1.04 PERFORMANCE REQUIREMENTS

A. Thermal Movements:
   1. Movements: Provide for expansion and contraction of component materials as will be caused by metal temperature range of 180 degrees F without causing harmful buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects.

B. Structural: Design to meet the following criteria:
   1. Positive and negative wind pressures as required by ASCE 7 but not less than 25 psf without failure or permanent deformation of any component.
   2. Deflection of any metal framing member in a direction normal to the plane of the translucent panel assembly shall not exceed 1/175 of its clear span, with a maximum of 3/4". The perimeter members shall not exceed 3/8" maximum deflection.
   3. Deflection of any member in a direction parallel to the plane of the translucent panel assembly, when carrying it's full design load, shall not exceed 1/8". In plane deflections at corner mullions shall not exceed 1/4" at any time.
   4. Withstand all loads required by code and as indicated on the structural drawings.
   5. Seismic and snow loads as required by Code.
   6. Wind load: Provide independent testing lab reports for a weathered vs. a new panel assembly.
      a. Test standard: 16mm panel assembly, 6’ wide x 12’ long that have been exposed to Florida weather conditions for 100 months.
         1) Loading: ASTM E-330-97.
         2) Cycling: ASTM E 1886-97.
         3) Impact Resistance: positive and negative design loads and level D impact ASTM E-1996-02.

C. Water Penetration: No water penetration of the panel U / H joint connection length at test pressure of 10.0psf. ASTM E-331

D. Flammability:
   1. The translucent panels interior surface to have a Class A flame spread of no greater than 20 and smoke development no greater than 75. ASTM E 84/ASTM D2843
      a. Interior flame spread classification of Class I per ASTM E84.
      b. Minimum self-ignition temperature of 1000°F per ASTM 1929. The panel shall be self-extinguishing.

E. Impact Resistance - the panels shall pass the following tests:
   1. Impact and Shatter Resistance of 200 ft. lbs. ASTM D-3841/SPI
   2. impact resistance of 350 ft. lbs. SFBC – PA 201-94.
   3. Must comply with standard specification for performance of exterior windows or curtain walls when impacted by windborne debris at level D and after cyclic wind loading at the specified design load. ASTM E-1996-02

1.05 SUBMITTALS

A. Submit in accordance with Section 01 33 00.

B. Shop Drawings: Details shall be full scale showing construction of all parts of the work, including metal, translucent sandwich panel, methods of joining, details of all field connections, and anchorage, fastening, sealing materials and methods, metal finishes, coordination with and large scale details of adjacent materials and all pertinent information.

C. Samples:
   1. Finish: Color finish samples of specified finishes on appropriate extrusions and/or sheet. Extrusions shall be minimum of 12" long and sheet a minimum of 12" x 12" square. All samples are to show any variation in color which may be expected on final installed product.
   2. Translucent panels: minimum 12" square, of all types specified.
   3. Sealant Color: color chart and sample for selection.

4. Accessories: Samples of gaskets, side spacers or shims.

D. Product Data: Test data on all proposed sealants.

E. Calculations: When requested by the Architect, submit calculations certified and stamped by a professional structural engineer licensed in the state in which the Project is located. Calculations shall certify structural adequacy of all system framing, connections to structure and translucent panels analysis. Coordinate calculations submittal with shop drawing submittals. All stresses and deformations shall be presented to demonstrate compliance with the performance requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer: Engage a single firm to assume undivided responsibility for all components of translucent panel assembly work. This firm must demonstrate not less than 5 years successful experience in fabrication and installation of work similar to the work of this project.

B. Installer: All work shall be performed by skilled workmen, especially trained and experienced in this type of work. If the installing contractor chooses to subcontract the installation of work, the proposed sub contractors qualifications shall be filed with the Architect.

C. Quality Control: Panel unit system manufacturer must be listed by a recognized building code authority, such as the International Conference of Building Officials, which required yearly quality control inspections by an approved agency for panel construction.

1.07 DELIVERY, STORAGE AND HANDLING

A. All materials delivered to the site shall be stored in spaces provided by the Construction Manager. These spaces shall be located where the stored materials will not be exposed to wetting or damage, and shall permit easy access to and handling of the materials. Materials shall be stored neatly and properly stacked.

B. Deliver other materials, except bulk materials, to project site in manufacturer's unopened containers with name, brand, type, grade and color fully indicated thereon. Store bulk materials as required to avoid any deleterious effects of weather, soiling or contamination.

1.08 WARRANTY

A. Comply with requirements of Section 01 33 50 - Warranties.

B. Translucent panel assembly shall be guaranteed by manufacturer and Contractor to Owner against leaks, failures, and defects of materials or workmanship. Guarantee to provide full labor and materials as required to restore system to watertight condition and defective materials without cost to Owner.

C. Manufacturer's warranty shall provide primary coverage and will be looked to for initial relief from claims made by Owner.
1. Contractor's warranty shall provide secondary coverage to extent that manufacturer's warranty does not apply. Contractor will be looked to for relief from claims made by Owner and not provided by manufacturer.

D. Warranty Period:
1. Weathertightness and defects of material and installation: 10 years.
2. Translucent Panels: As specified within except no condition of warranty to be less than 10 years.

3. Paint Finish: 10 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. System based on “Pentaglas 12 System” by CPI Daylighting, Inc., Phone: (800) 759-6985, Fax (847) 816-0425; www.cpidaylighting.com

B. Equal Manufacturers: As approved.

2.02 MATERIALS

A. Metal Components:
1. Primary structure: Provided by work of another Section. System shall meet design load and design criteria indicated on the Structural Drawings.
2. Secondary Structure: Minimum ratio of the panel weight to the panel thickness should be 0.47” thick Pentaglas 12 panel, 0.54 LB. per S.F.

B. Aluminum Extrusions and Sheet: Shapes, sizes, and thickness as shown and as required to fulfill performance requirements. Suitable alloys for fabrication, structural characteristics, and application of specified finish.
1. Extrusions: 6063-T6: 6063-T5 ASTM B 221.
2. Sheet/Plate: ASTM B 209.
3. Flashing: 5005 H34 aluminum 0.04” minimum thickness.
4. Sheet metal flashings/closures/claddings are to be furnished shop formed to profile indicated. Field trimming of the flashing and field forming the ends is acceptable. Sheet metal ends are to overlap at least 6-inches and set in a full bed of sealant. Rivet as required to maintain flashing integrity.
5. Fasteners:
   a. Exposed: Series 300 stainless steel finished to match adjacent aluminum.
   b. Unexposed: Cadmium and colored chromate plated and meeting Federal Specification QQ-P-416C, Type II, Class #1 (.005 inches thick plating).
   c. Self drilling fasteners shall be "DRIL-FLEX" as manufactured by Elco Industries, Inc. No substitution.
   d. Nuts At Expansion or Moving Connections: Design to provide positive means of preventing disengagement. Staking or threads being deformed not acceptable.
6. Steel for Anchorage: Shapes and thicknesses required to meet structural requirements for their use. ASTM A 36.

C. Sealant:
1. Exterior Sealants:
   a. Silicone: As specified under Section 07 92 00 for medium modulus sealant.
   b. Custom colors as selected by the Architect.
2. Internal Seals: Manufacturer’s standard.
3. Backer Rod: as specified under Section 07 92 00.

2.03 FABRICATION

A. Translucent Panels: Clear integral extruded structural core with cell size of 0.18 inch or less. Exterior skins of panels shall be divided by multiple parallel horizontal surfaces formed by truss-like ribs, perpendicular to the skins.
1. Panel Thickness: .47 inch (12mm) single panel.
2. Panel Width: 24 inches maximum.
3. Batten Height: 1.25 inches.

4. Insulation Value: "U"= 0.48.NFRC 100.
5. Color: Clear.

B. Joint System:
1. Panel Joints:
a. Single extruded length without transverse seams.
b. Batten Seam: 90 degree upturned standing seam integral to the panel. Welding or gluing of standing seam is not acceptable.
c. Applied Battens: Continuous "U" or "H" shaped battens with a double tooth locking grip-lock mechanism to meet Performance Requirements indicated in PART 1 above.
2. Retainer Clips: 0.4 wide stainless steel retention clip with a tested to meet a wind uplift standard of 90 psf per ASTM E330-97. Free movement of the panels shall be allowed to occur without damage to the weather tightness of the completed system.

C. Protection of Materials:
1. Protection against galvanic action shall be provided wherever dissimilar metals are in contact, except in the case of aluminum in contact with galvanized steel, zinc or relatively small areas of stainless steel or nickel silver (white bronze). This protection shall be provided by painting the dissimilar metal surfaces with a heavy coat of zinc chromate primer.
2. Aluminum which is to be in contact with cured concrete, mortar or plaster shall have the contact surfaces protected. This shall be accomplished by the use of a 30 mil dry film heavy coat of bituminous paint applied to the aluminum or other permanent separator on the concealed contact surfaces of aluminum before assembly or installation.

D. Welding:
1. All welding shall be in accord with pertinent recommendations of the American Welding Society and shall be done with electrodes and/or by methods recommended by the suppliers of the metals being welded. Type, size and spacings of welds shall be as shown on approved shop drawings and structural calculations.
2. Perform welds behind finished surfaces shall be done as to minimize distortion and/or discoloration on the finished side. Weld splatter and welding oxides on finished surfaces shall be removed by descaling and/or grinding.
3. Any weld splatter on glass will be cause for rejection of panels.

E. Finish:
1. Exposed Metal Surfaces: Clear Anodized finish.
2. Concealed Surfaces: Manufacturer's standard.
3. Shop Paint for Steel: Unless galvanized or scheduled for other finish, thoroughly clean carbon steel of all loose scale, filings, dirt and other foreign matter and paint with zinc chromate primer, per F.S. TT-P-645.

PART 3 EXECUTION

3.01 EXAMINATION

A. Lines and Grades: Verify location and elevation lines and marks for translucent panel assembly work are correct.

B. Inspect substrates to which work of this section adjoins for conditions which may impair or be detrimental to the performance of the system. No work shall be installed until corrections to substrates have been performed by trades involved.

3.02 INSTALLATION

A. Install work in accordance with approved shop drawings and manufacturers recommendations.

B. Workmanship: All parts of the translucent panel assembly shall be erected plumb and true, in proper alignment and relation to established lines and grades, as shown on approved shop drawings.

C. Anchorage:
1. Anchorage of the translucent panel assembly to the structure shall be by approved methods in accordance with approved shop drawings. Supporting brackets shall be so designed as to provide three-dimensional adjustment and accurate location. Once system is properly positioned, all connections so designated on approved shop drawings shall be rigidly fixed by welding or other positive means.
2. Expansion anchorage shall be so designated to provide for thermal and building movements. Anchorage design shall provide for unrestricted movement.

D. Welding: All welding shall be done by skilled mechanics qualified or licensed in accord with local building regulations, and shall conform to the recommended practices of the American Welding Society. Special care shall be taken to protect translucent panels and other finished surfaces from damage and to prevent causing fires. All welds must be coated with zinc chromate primer.

E. Field Cutting: The quality of field cutting shall be the same as for shop cutting.

F. Sealants: Sealing materials specified shall be used in accordance with the manufacturer's printed instructions, and shall be applied only by mechanics specially trained or experienced in their use.
1. Completely remove all mortar, dirt, dust, moisture and other foreign matter from surfaces receiving sealant before applying sealant
2. Mask adjoining surfaces when needed to maintain a clean and neat appearance.
3. Tool sealing compounds to fill the joint and provide a smooth finished surface.

3.03 ACCEPTANCE

A. Installed materials which are damaged or which in the opinion of the Architect do not conform to the Specification requirements, shall be removed and replaced with acceptable material at no additional cost to the Owner.

3.04 PROTECTION AND CLEANING

A. The Contractor shall be responsible for the protection of the work against damage by other trades, as well as final cleaning and washing of translucent panels and aluminum.

END OF SECTION

SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Operating and Fixed Aluminum Window Units
   a. Horizontal Sliding Units Above Louver in Integral Master Frame.
      1) Louvers to be provided by Window Manufacturer
2. Perimeter Sealant
3. Glass and Glazing
4. Wood Blocking, Shims, Anchors, Clips, and all accessories necessary for a complete installation.
5. All Aluminum Trim and Closure Pieces
6. All Operable Window and Hardware

B. Related Sections:

1. Section 07 62 00 - Sheet Metal Flashing and Trim
2. Section 07 92 00 – Joint Sealants
3. Section 08 41 13 - Aluminum Entrances and Storefront
4. Section 08 80 00 - Glazing

1.02 REFERENCES

A. The Aluminum Association (AA)

1. "Aluminum Design Manual 2000: Specifications for Aluminum Structures"

B. American Architectural Manufacturers Association (AAMA) Publications:

1. 1503 "Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections"
2. 2400 "Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction"
3. 2604 "Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels"
4. 2605 "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels"

C. American National Standards Institute (ANSI) Publications:

1. Z97.1 "Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings"

D. ASTM International (ASTM) Publications:

1. C1036 “Standard Specification for Flat Glass”
2. C1048 “Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass”
3. E90 “Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements”

4. E283 “Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen”
5. E330 “Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference”
6. E331 “Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference”
7. E413 “Classification for Rating Sound Insulation”
8. E547 "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference"
9. E774 “Standard Specification for Sealed Insulating Glass Units”
10. E1886 "Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials"
11. E1996 "Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes"
12. F588 "Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact"

E. Glass Association of North America (GANA)

1. "GANA Glazing Manual"

F. Federal Specifications (FS) Publications:

1. FS-RR-W-365A "Wire Fabric (Insect Screening)"

G. Insulating Glass Certification Council (IGCC)

H. Insulating Glass Manufacturers Alliance (IGMA) Publications:

1. Glazing Guidelines

I. National Fenestration Rating Council (NFRC)

J. Screen Manufacturers Association (SMA) Publications:

1. 1004 "Specifications for Aluminum Tubular Frame Screens for Windows"

K. U.S. Consumer Product Safety Commission (CPSC) Publications:

1. 16 CFR Part 1201 "Safety Standard For Architectural Glazing Materials"

L. Window and Door Manufacturers Association (WDMA) Publications:

1. ANSI/AAMA/WDMA 101/I.S.2/NAFS-02 “Voluntary Performance Specification for Windows, Skylights and Glass Doors”
2. AAMA/WDMA/CSA 101/I.S.2/A440-08 “Standard/Specification for Windows, Doors and Unit Skylights

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 - with the following supporting data:

1. Product data for each type of aluminum window specified, including standard construction details, dimensions of individual components, profiles, finishes, hardware, and accessories.

2. Shop drawings for each type of window specified, including 1/4-inch scale wall elevations, typical unit elevations at 3/4 inch scale glazing details, full-size details of typical composite members and the following:
    a. Panning Details.
    b. Flashing and drainage details.
    c. Mullion details, including reinforcement and stiffeners.
    d. Joinery details.
3. Samples: Provide full-size or partial-size sample of window illustrating glazing system, quality of construction and finish.
    a. Hardware: Full-size units with factory-applied finish.
4. Product certificates signed by the window manufacturer certifying that window units comply with specified performance requirements.

B. LEED Submittals:
    a. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating 20% percentage by weight of postconsumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.
    b. Product Data for Credit EQ 4.1: For glazing sealants and adhesives used inside of the building envelope, including printed statement of VOC content.

1.04 DEFINITIONS

A. Performance grade number, included as part of the AAMA/WDMA/CSA 101/I.S.2/A440-08product designation code, is actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.

1.05 QUALITY ASSURANCE

A. All window units shall be manufactured by a single source.
    1. All windows in any one project must be by the same manufacturer and with comparable frame depth, profile, glazing bite and installation requirements. Manufacturer must provide a window system that can incorporate all window configurations used on the project.
    2. Standards: Requirements for aluminum windows, terminology and standard of performance, and fabrication workmanship are those specified and recommended in AAMA/WDMA/CSA 101/I.S.2/A440-08 and The Aluminum Association (AA).
        a. All window units shall be labeled as conforming to AAMA/WDMA/CSA 101/I.S.2/A440-08. The label shall state the name of the manufacturer, the approved labeling agency and the product designation as specified in AAMA/WDMA/CSA 101/I.S.2/A440-08.
        b. All testing shall be conducted using AAMA/WDMA/CSA 101/I.S.2/A440-08Gateway Performance minimum specified test sizes.
    3. Provide aluminum windows of the performance class and grade indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440-08.

B. Sections 08 41 13, 08 51 13, and 08 80 00 to be furnished by single source insuring product compatibility and coordination.

C. Certify that windows have been tested in accordance with American Architectural Manufacturers Association (AAMA/WDMA) Specification for Performance Class specified complying with the following performance standards:

1. AAMA/WDMA/CSA 101/I.S.2/A440-08 Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440-08.

   a. Performance Class: C

   b. Performance Grade: 40

   c. Exception to AAMA/WDMA/CSA 101/I.S.2/A440-08: In addition to requirements for performance class and performance grade, design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch, whichever is less, at design pressure based on the following:

      1) Testing performed according to AAMA/WDMA/CSA 101/I.S.2/A440-08, Uniform Load Deflection Test.

2. Uniform Structural Properties (ASTM E330): Pressure acting inward and outward. Window to be operable and maximum .4% permanent deformation, per member, when tested at a static air pressure difference of the following:

   a. Class C-40: 60.0 PSF

3. Water Resistance (ASTM E331 and ASTM E547): No water penetration at test pressures indicated.

   a. Class C-40: 6.00 PSF

4. Air Leakage (ASTM E283):

   a. Sliding Windows: Maximum 0.37 CFM per sq./ft. of total exterior surface area, when tested at a static air pressure difference of 1.57 PSF minimum .

   b. Fixed Windows: Maximum 0.15 CFM per sq. ft. of total exterior surface area, when tested at a static air pressure difference of 1.57 PSF minimum.

   c. Forced Entry Resistance (ASTM F588): To performance level 10.

D. Sound-Insulation Construction: Provide window units certified to provide a Sound Transmission Class (STC) rating of at least values shown below when tested according to ASTM E 90 and classified according to ASTM E 413.

1. All Fixed and Operable Window Units: STC- 35

E. Glazing Standards: Comply with recommendations of Glass Association of North America (GANA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.

1. Safety Glazing Products: Comply with testing requirements in CPSC 16 CFR Part 1201.

   a. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

2. Insulating glass shall comply with standard for construction and insulating value as established by:

   a. Insulating Glass Manufacturers Alliance (IGMA).

   b. Insulating Glass Certification Council (IGCC)

F. Glazing and Sealant: Per manuals published by the Flat Glass Marketing Association (FGMA). Glazing and sealant to match approved colors for all aluminum framing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Transportation and Handling: Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging. Provide equipment and personnel to handle products by method to prevent soiling or damage. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

B. Storage and Protection: Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain with temperature and humidity ranges required by manufacturer's instruction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Window Units:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. Traco Commercial Group (800-837-7002)

1) Horizontal Sliding Unit over Louver: TR-6400 Series Slider over Louver

2) Fixed Units: TR-7400 Series

b. Quaker Window Products Company, Inc. (800-347-0438)

1) Horizontal Sliding Unit over Louver: “1300 SL Series Slider over Louver Series

2) Fixed Units: “2000PW Series”

c. Milgard Windows (253-922-2030)

1) Horizontal Sliding Unit over Louver: Series 1120 Slider over Louver Series

2) Fixed: Approved Substitution

B. All fasteners, tools, equipment, and other materials necessary for a complete installation shall be furnished by this Contractor.

1. Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with all window members, cladding, trim, hardware, anchors, and other components

C. Insect Screens: Provide removable insect screen panel for each moveable glazed sash.

1. Screen Fabric: 18 by 16 mesh of 0.013" diameter aluminum wire. Comply with FS-RRW-365, Type VII, except black anodized or "gun metal" coating on wire.

2. Screen Frame: Provide formed or extruded aluminum frames and removable vinyl fabric-retainer spline.

a. Finish shall match window.

D. Louvers

1. Aluminum louvers to be furnished and installed glazed within integral master frame of window units where shown on Drawings. Louver free area to be coordinated with mechanical PTAC units supplied by Division 23.

a. Fixed Blade Angle: 42 degrees

b. Provide PTAC Collar

c. Provide 0.032 inch aluminum sheet blank-off panels with 1" insulation on each side of PTAC unit on rear side of louver.

d. Finish: Match Windows

E. Accessories:

1. Safety Device Stops: For operable windows, provide stops to prevent opening greater than 4" at top and bottom of frame. Stops shall be constructed of stock window frame.

a. If local code requires window units to open fully, provide the following:

1) “Charlie-Bar” security device by Charles Bar-Lok Corp. (708-333-0071).

2) Size to fit window opening, Aluminum finish.

2. Sills: Manufacturer's standard exterior sills with slide in nailing fin, type as shown on Drawings.

a. Nailing fin: Manufacturer's standard nailing fin.

b. Sill Flashing: Manufacturer’s standard snap-on sill flashing for use with EIFS exterior finishes and metal panel system.

3. Trim: Manufacturer's standard interior snap trims, type as shown on Drawings.

4. Head Flashing: Manufacturer’s standard head flashing for use with EIFS exterior finishes and metal panel system.

5. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Hardware:

1. Sash lock: Manufacturers' standard. Provide two (2) per unit with upper lock installed at 72” above finish floor maximum.

2. Wheels and Sliding Mechanism: Manufacturer's standard.

G. Maximum operating force: once sash in motion:

1. Horizontal Sliding Windows: 20 LBF

H. Operating sash in guest rooms to be located closest to center of room.

2.02 GLASS MATERIALS

A. Provide glazing as specified in specification section 08 80 00.

2.03 FINISHES

A. All exposed aluminum surfaces shall have a manufactured-applied, 15-year warrantied, Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

1. Color to be Clear Anodized as shown in the Exterior Finish Index.

2.04 JOINT SEALANTS – FRAMING SYSTEM

A. For metal to metal joints use Manufacturer's standard, recommended by manufacturer for joint type, color to match finish of aluminum to which applied.

B. For perimeter of framing members, refer to Section 07 92 00 – Joint Sealants.

2.05 FABRICATION

A. Fabricate windows allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.

B. Rigidly fit joints and corners. Accurately fit and secure corners tight. Make corner joints flush, hairline, and weatherproof. Seal corner joints with sealant.

C. Develop drainage holes with moisture pattern to exterior.

D. Prepare components to receive anchor devices. Fabricate anchorage items.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Installation Details: Before proceeding with the manufacturing of the windows and doors, the Window Contractor shall submit complete installation details for approval by the Architect. These Drawings shall show elevations of windows, full-sized details of all sections of windows, collateral materials and details of anchorage. Supplemental data shall contain calculations of moments of inertia on frames and mullion connections plus instructions for storage, handling, and erection of windows and sliding doors. Conform to AAMA 2400 for Nail Fin Installation.

B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

C. Beginning of installation means acceptance of existing conditions.

D. Align window frame plumb and level, free of wrap or twist. Maintain dimensional tolerances, aligning with adjacent work.

E. Coordinate attachment and seal of air and vapor barrier materials. Install under sill flashings, if required.

F. Pack fibrous insulation in shim spaces at perimeter to maintain continuity of thermal barrier.

G. Install perimeter sealant, backing materials, and installation requirements in accordance with Section 07 92 00. Apply sealant to ends of sill for watertight seal.

H. Windows shall be installed by experienced workmen in exact accordance with the manufacturer's instructions and approved Shop Drawings.

I. Erection Tolerances:

1. Maximum deviation from established vertical or horizontal reference lines:

a. 1/8 inch per 12 feet of length of any member.

b. 1/4 inch in any continuous run.

2. Maximum offset from true alignment between two adjoining members in line, end to end, 1/16 inch.

J. Adequately anchor frames to surrounding construction. Place anchors at 2'-0" on center maximum or as required to maintain position of frames when subjected to thermal and building movement and specified wind load.

1. Anchorage method to be integral nailing fin. Alternate anchoring methods will not be acceptable.

3.02 ADJUSTING AND CLEANING

A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be responsibility of General Contractor.

B. Remove protective material from prefinished aluminum surfaces.

C. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

Revision Log

SECTION 08 71 00 - DOOR HARDWARE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. All the finish hardware including all screws, bolts, and other devices required to complete the work.
2. Lock cylinders for locks specified in other Sections.
3. Miscellaneous hardware.
4. Hardware furnished for shop or factory installation on doors and frames.
5. Keys and Keying.

B. Related Sections:

1. Section 01 79 00 – Demonstration and Training
2. Section 08 11 13 - Steel Doors and Frames
3. Section 08 14 00 - Wood and Plastic Doors
4. Section 08 41 13 - Aluminum Entrances and Storefronts
5. Section 08 42 29 - Automatic Entrances
6. Division 26 Sections - Coordination with items requiring electrical connections.

1.02 REFERENCES

A. Perform all work in accordance with the following:

1. American National Standards Institute (ANSI) Publications:
   a. ICC/ANSI A117.1-2003 “Accessible and Useable Buildings and Facilities”
   b. ANSI/BHMA A 156.1 "Butts & Hinges"
   c. ANSI/BHMA A 156.2 "Bored and Preassembled Locks and Latches"
   d. ANSI/BHMA A 156.3 "Exit Devices"
   e. ANSI/BHMA A 156.4 "Door Controls - Closers"
   f. ANSI/BHMA A 156.5 "Auxiliary Locks and Associated Products"
   g. ANSI/BHMA A 156.6 "Architectural Door Trim"
   h. ANSI/BHMA A 156.13 "Mortise Locks & Latches"
   i. ANSI/BHMA A 156.17 "Self-Closing Hinges & Pivots"
   j. ANSI/BHMA A 156.18 "Materials & Finishes"
   k. ANSI/BHMA A 156.21 "Thresholds"
   l. ANSI/BHMA A 156.22 "Gasketing and Edge Seal Systems"
   m. ANSI/BHMA A 156.23 "Electromagnetic Locks"
   n. ANSI/BHMA A 156.26 "Continuous Hinges"
   o. ANSI/BHMA A 156.28 "Keying Systems"
2. ANSI/DHI Publications:

a. ANSI/DHI A115.1G "Installation Guide for Doors and Hardware"

3. Builders Hardware Manufacturers Association (BHMA)

4. Door and Hardware Institute (DHI) Publications:

a. DHI-WDHS-3 "Recommended Hardware Locations for Wood Flush Doors"

b. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames"

5. National Fire Protection Association (NFPA) Publications:

a. 80 “Standard for Fire Doors, Fire Windows”

b. 101 "Life Safety Code"

c. 252 “Standard Methods of Fire Tests of Door Assemblies”

6. Underwriter's Laboratories, Inc. (UL) Standards

a. 10B "Standard for Fire Tests of Door Assemblies"

b. 10C "Positive Pressure Fire Tests of Door Assemblies"

c. 305 "Panic Hardware"

7. Window and Door Manufacturers Association (WDMA)

B. Regulatory Requirements:

1. Conform to NFPA 80, and other applicable codes for requirements applicable to fire rated doors and frames.

2. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., and acceptable to the public authority as suitable for the purpose specified and indicated.

3. Conform to requirements of ADA (Americans with Disabilities Act)

4. Accessibility: Hardware for doors used by the disabled shall comply with all state and local codes which shall supersede this Section. Notify the Architect of conflicts between regulations and this specification prior to providing hardware.

5. Conform to requirements of The Ohio Building Code, 2007.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

2. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:

1) Type, style, function, size, and finish of each hardware item.

2) Name and manufacturer of each item.

3) Fastenings and other pertinent information.

4) Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule. Submittals shall use the same designations for door and hardware numbers as shown on the Drawings.

5) Explanation of all abbreviations, symbols, and codes contained in schedule.

6) Mounting locations for hardware.

7) Door and frame sizes and materials.

8) Keying information.

3. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.

4. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

5. Templates for doors, frames, and other work specified to be factory-prepared for the installation of door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Architectural Hardware Consultant (AHC) who is available at reasonable times during the course of the work, for consultation about Project’s hardware requirements.

1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.

2. The Guest Room security system shall be installed by a Contractor certified by the manufacturer of the system.

3. Hardware supplier for Guest Room security system shall provide supervision during installation as well as training for Courtyard personnel prior to opening of facility.

C. Fire-rated Openings: Provide door hardware for fire-rated openings that complies with NFPA 80, based on testing per NFPA 252, and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriter's Laboratories, Inc. (UL), Warnock Hersey, ETL SEMKO division of Intertek (WHI), FM Global (FMG), or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

D. Inspection: General Contractor shall provide in writing to Owner's Representative an inspection of all steel doors and frames for conformance to specifications. Inspection shall include checking for fit tolerance plumb and level as well as proper hardware and operation.

1.05 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.06 CERTIFICATIONS

A. Conform to governing Building Codes for requirements applicable to the work specified herein.

B. Conform to NFPA 101 with regard to requirements for fire-rated doors and frames.

C. Hardware for doors in accessible locations as defined by the Americans with Disability Act (ADA) shall comply with all state and local codes which shall supersede this section. The Architect shall be notified of any conflicts between regulations and the specifications prior to the purchase and installation of any hardware.

1.07 SCHEDULING

A. Reinforcement for all hardware for metal doors and frames shall be installed at the factory and be made to template and furnished with machine screws. The face of locks shall be beveled to match the bevel edge of metal doors. All hardware for the metal doors shall be ordered as soon as possible after the Contract is awarded.

1.08 DELIVERY, STORAGE AND HANDLING

A. Legibly mark and label each package, indicating item and location for which it is intended. Each marking shall correspond to the number shown on the approved hardware schedule. Each package shall contain all the required screws, bolts and fasteners necessary for installation of each hardware item.

1. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

2. Include basic installation instructions with each item or package.

B. Construction keys: Tagged and plainly marked on face of envelope with the key change number, door designation and all other required information and mailed directly to the Owner.

C. Permanent keys: Identified by lock manufacturer and opening to which they apply. Lock manufacturer shall place each set of keys into an envelope and label same with door numbers for rooms or areas. Mark boxes of keys with project name and location and ship Change Keys, Master Keys, and Grandmaster Keys via prepaid registered mail to Owner.

D. Guest Room Security Systems: Guest room card keys, master keys, and maids keys to be keyed in accordance with instructions provided by Owner's Loss Prevention Technical Service Department.

1.09 SPARE MATERIALS

A. Refer to Section 01 78 43.

1.10 WARRANTY

A. Furnish a written guarantee which shall cover the periods stated below from and after the completion of the building and its acceptance by the Owner.

B. For a period of one (1) year after final acceptance by the Owner. Hardware failing to comply with warranty shall be removed and replaced with new material including labor at no cost to Owner.

C. Provide the following special warranties starting from the date of substantial completion:

1. Door Locksets: Two (2) years.

2. Computer Systems: One (1) year.

3. Card Readers and other electrical equipment: Two (2) years.

PART 2 PRODUCTS

2.01 DISTRIBUTOR

A. Avendra, LLC Preferred Manufacturers:

1. Contract Hardware, Inc. (800-266-3418)

a. Contact: Mark Tew

2.02 . MANUFACTURERS

A. Hardware manufacturers are specified for each hardware item to establish a standard of quality and minimum functional requirements. In the hardware schedule at the end of this Section, product model numbers are used as part of this description to assist in identifying individual items.

B. Items of a particular hardware category, i.e., locksets, closers, hinges shall be of the same manufacturer.

C. Avendra, LLC Preferred Manufacturers:

1. VING VingCard, An ASSA ABLOY Group Company (800-225-8464)

D. Approved Manufacturers and Abbreviations:

1.	ARM	Adams Rite Manufacturing Co., An ASSA ABLOY Group Company (800-872-3267)	
2.	CBL	Charles Bar-Lok Corp.	(708-333-0071)
3.	DE	Detex Corp.	(800-729-3839)
4.	DCI	Door Controls International	(800-742-3634)
5.	DOM	Dor-O-Matics, an IR Ingersoll-Rand Business	(800-243-4830)
6.	EDL	J. G. Edelen Company, Inc.	(410-918-1200)
7.	FAS	Folger Adam EDC, An ASSA ABLOY Group Company	(800-260-9001)
8.	HAG	Hager Companies	(800-255-3590)
9.	HES	HES, An ASSA ABLOY Group Company	(800-626-7590)
10.	IVES	Ives, an IR Ingersoll-Rand Business	(877-424-8494)
11.	LCN	LCN Closers, an IR Ingersoll-Rand Business	(800-526-2400)
12.	LOK	Locknetics by Schlage, an IR Ingersoll-Rand Business	(860-584-9158)
13.	MCK	McKinney Products Company, An ASSA ABLOY Group Company (800-346-7707)	
14.	MOC	Doug Mockett Company, Inc.	(800-523-1269)
15.	NOR	Norton Door Controls, An ASSA ABLOY Group Company	(800-438-1951)
16.	ONT	Onity (Tesa Entry Systems)	(800-424-1433)
17.	PEM	Pemko Manufacturing Company	(800-283-9988)
18.	PUL	JAI PULNiX America, Inc.	(800-445-5444)
19.	RIX	Rixson Specialty Door Controls An ASSA ABLOY Group Company (800-457-5670)	
20.	RO	Rockwood Manufacturing Co.	(800-458-2424)
21.	SAF	Saflok, a Kaba Group Company	(800-999-6213)

22.	SAR	Sargent Manufacturing Co., An ASSA ABLOY Group Company	(800-727-5477)
23.	SEC	Securitron, An ASSA ABLOY Group Company	(800-624-5624)
24.	SCH	Schlage, an IR Ingersoll-Rand Business	(800-847-1864)
25.	SIM	SimplexGrinnell, A Tyco Company	(800-746-7539)
26.	STA	Stanley Hardware	(860-225-5111)
27.	TRM	Trimco/BBW (Quality)	(323-262-4191)
28.	VDI	Von Duprin, an IR Ingersoll-Rand Business	(317-613-8944)
29.	YAL	Yale Commercial Locks & Hardware, An ASSA ABLOY Group Company	(800-438-1951)

2.03 **GENERAL REQUIREMENTS**

A. Electronic Security System Description

1. Install an electronic lock system, complete and including without limitation, the following components:

2. Avendra, LLC Preferred Manufacturers:

a. "Classic"; VingCard, An ASSA ABLOY Group Company (800-225-8464)

1) Classic Series with the Wing lever.

2) Provide Auto Deadbbolt Option (ADB) at all Guestroom Entry Doors

3. Approved Manufacturers:

a. “Saflok Adese” ; Saflok, a Kaba Group Company (800-523-9605)

1) Adese model with the Apogee lever.

2) Provide Auto Deadbolt Option (ADB) at all Guestroom Entry Doors

b. “Onity HT-28”; Onity (800-749-2983)

1) HT28 Smart lock with the Jerez lever.

2) Provide Auto Deadbolt Option (ADB) at all Guestroom Entry Doors

4. Guest Room Locking System, Front Desk System

a. “Saflok Desk Link System”, or approved substitution by listed manufacturer.

b. Microprocessor based Front Desk Controller System shall be a PC base motorized key encoding system with remote system printer and lock integration (LPI) feature. Include the following:

1) Main PC Base computer, RS232 Cable and support hardware.

2) Motorized keycard encoder station and power supply.

3) 1 Each Basic System Items: Manuals, etc.

4) 1 Each System Printer with Serial Cable

5) Keycards: Generic reusable plastic magnetic keycards. Quantity: 1700 and 300 emergency keycards.

c. System shall be designed for the following features:

1) Password access to front desk system

2) Transaction log of last 4,000 transactions

3) Simple three-step check in progress

4) Encoder to be insertion type

5) Encoder must encode and validate cards

6) Encoder must be able to "read a card"

7) Back-up cards in case of catastrophic power failure

8) Portable programmer interrogator: Password protected and be able to program up to 250 locks. Shall be separate from Front Desk Controller, furnish two Front Desk Controllers. Program shall include:
   (a) Set time clock
   (b) Perform diagnostic check
   (c) Interrogate up to last 100 entries: time, date and card identification

9) Front Desk Controller to have "hot" keys for front desk check-in type function.

10) Front Desk Controller must have capability of adding a secondary station that communicates with Primary Front Desk Controller in order to prevent double issuing keys for rooms.

d. Guest Room: Locks shall be opened by a correctly coded card, upon removal after insertion. Use of a newly issued card shall automatically re-key the lock to void the previous card, and guest cards shall additionally self-cancel by date and time automatically. Perimeter door reader to allow authorized guest cards. Canceled cards must not access perimeter reader.

1) Audit trail in lock of last 100 entries - time, date, and card identification

2) Office/passage function by card for offices, entry doors or hospitality suites

3) Reusable ABA standard magstripe cards

4) Four (4) standard AA batteries or a four (4) AA battery pack

5) Non-volatile memory lock will not lose program even if the batteries are removed

6) Four levels of master/staff cards; 50 masters per level

7) Staff cards shall be individualized to identify individual card holder via lock audit

8) All cards are time limited

9) For Finish and Lever design see hardware sets

10) Deadbolt override cards for emergency level and guest cards (programmable).

11) Simultaneous retraction of deadbolt and latchbolt (1" steel dead bolt with security pins and 3/4" anti-friction latch bolt).

12) Intelligent power shutdown feature. Batteries remain deactivated until keycard is inserted. Master level card key will activate a flashing red “Low Battery” light warning system three (3) months in advance of battery failure.

13) Mortise lockset to conform to BHMP Grade One, and meet UL Fire Rating C through A

14) Exterior door applications shall have special weather protection stand.

e. Demonstration Unit: Guest Room lockset, mounted in a finished hardwood stand.

B. Butt Hinges: Unless otherwise scheduled, shall be five-knuckle, full mortise template, ball bearing type with non-rising loose pin, flat button tip. Exterior hinges, and certain others as scheduled, shall have non-removable pins by use of set screw in the barrel. These are identified in the schedule as "NRP".

1. Sizes:

a. Size of hinges to be 4-1/2" x 4-1/2" for 1-3/4" doors up to 36" wide; 37" to 48 hinges to be heavy weight 5" x 4-1/2" unless listed otherwise in hardware sets.

C. Standard Locks and Latches: Locks shall utilize standard cutouts to facilitate interchange without further mortising. Strikes for locks and latches shall have only the minimum lip projection required to protect trim. Lock and trim shall conform to ANSI/BHMA A156.2

D. Exit Devices: Shall be listed under "Panic Hardware" in accident equipment lists of Underwriters Laboratories. Where labeled fire doors are used as exits, they shall be equipped with labeled "Fire Exit Hardware". Exit devices shall conform to ANSI/BHMA A156.3

E. Thresholds at all door usable by the handicapped shall not exceed 1/2" in height above finished floor.

F. Door Closers: Except where other device for automatically closing and controlling the action of swing doors is noted, shall be liquid type of rack and pinion design with working parts enclosed in a cast iron case. For doors subject to positive or negative HVAC pressures, closer size shall be adjusted accordingly. All Closures shall NOT be fastened with Through Bolts through doors. All Wood Doors with closers to be provided with 5" top block.

1. Materials and Features:

a. ANSI/BHMA A156.4, Grade 1

b. ICC/ANSI A117.1-2003

c. UL. listed. Provide closers for fire rated openings in compliance with NFPA 80, NFPA 101, and local building codes.

d. Provide closers with full covers

e. Extreme temperature fluid (temperature range from -30 degrees F to 120 degrees F.)

f. Provide delayed action closers where required by code

g. Finish: Provide factory painted or powder finish on exposed metal to match hardware, unless indicated otherwise.

h. Mounting: Hinge face mounting, unless otherwise indicated. Do not mount closers on exterior of building.

i. Size and mount units indicated or, if not indicated, to comply with manufacturer's recommendations for exposure conditions. Reinforce substrate as recommended.

j. Closers to be installed to allow door swing as shown on Drawings.

k. Door pull force:

1) Exterior Doors: Maximum 8.5 lbs.

2) Interior Doors: Maximum 5.0 lbs.

l. Provide mounting or drop plates as required by job conditions.

G. Door Stops: Wall type door bumpers shall be in accordance with ANSI/BHMA A156.16 and provided for all openings where conditions permit. In the event a wall type bumper cannot be used, a floor stop shall be provided.

1. Door Stop Mounting: Methods to suit substrates encountered (plastic anchor, drywall anchor, expansion shield, etc.)
2. Provide gray rubber exposed resilient parts
3. Do not furnish aluminum floor stops
4. Adjust height of floor stops to suit undercut of adjacent door.

H. Door Viewers: 180 degree angle of view.

I. Door Guards: Provide all guest room entry door guards with edge guards.

J. Thresholds at all doors usable by the handicapped shall not exceed 1/2" in height above finished floor with a maximum slope of 1:2 in accordance with ADA, and shall be in accordance with ANSI/BHMA 156.21.

K. Protective Plates and Trim: Materials: Protection plates conforming to ANSI 156.6, .050 minimum thickness, beveled edges (B4E) four sides. Mount centered, flush with bottom of door. Screws: Phillips head sheet metal screws plated to match plate.

L. Silencers for Metal Door Frames: ANSI/BHMA 156.16 Grade 1; neoprene or rubber, minimum diameter 1/2-inch; fabricated for drilled application to frame.

2.04 MISCELLANEOUS REQUIREMENTS

A. The hardware shall be the proper kind for its required use and shall fit its intended location. Should any hardware, as specified, fail to meet the intended requirements or require modification to suit the intended location, this matter, or any other necessary advance information, shall be brought to the attention of the Architect for correction or decision in ample time to avoid delay in the manufacture and delivery of hardware.

B. The finish hardware listed herein shall not be construed as necessarily being a complete hardware schedule, but shall be considered as an indication of the hardware requirements desired by the Architect. It shall be the Contractor's responsibility to examine the Drawings and door schedules and provide all necessary or additional hardware as required but not scheduled herein. Such items of hardware shall be of the same type, quality, and quantity as that scheduled for similar doors or similar purposes.

C. In the accompanying hardware list, catalog numbers used are those of specific manufacturers, used to establish a minimum standard of quality and requirements as to type, weight, mechanical construction and operation to which hardware shall conform. That list indicates manufacturers on which catalog numbers are based, as well as acceptable equivalent manufacturers.

D. Proposals shall be based on specified (base or acceptable equivalent) brands. If the Contractor wishes to submit other brands as equivalent to those specified, they shall enter such proposed substitutions separately from their basic proposal. For each item proposed, they shall enter the amount to be added to or deducted from his base bid in the event the proposed substitution is accepted by the Owner's representative. Substitute items shall not be used without the approval of Marriott International.

E. Finish:

1. All hardware items not otherwise scheduled shall have the following finish:

a.	Hinges, exterior	See Hardware Sets
b.	Hinges, interior	See Hardware Sets
c.	Lockset, etc.	See Hardware Sets
d.	Exit Devices	See Hardware Sets
e.	Push/Pull, Kickplates	See Hardware Sets

f. Stops, Holders See Hardware Sets

g. Door Closers See Hardware Sets

h. Thresholds See Hardware Sets

i. Door Bottoms See Hardware Sets

j. Miscellaneous See Hardware Sets

2. Finish and Base Material Designations: Numbers indicate BHMA Code or nearest traditional U.S. commercial finish, or manufacturer's finish designation.

2.05 CYLINDERS AND KEYING

A. Hotel System-Permanent Keying:

1. All locksets shall have manufacturer’s restricted keyway, reserved for Owner's use only.

a. Acceptable products are Sargent “VA”, Schlage “1345”, or approved substitution by listed manufacturers.

2. All locksets shall be construction masterkeyed.

3. Owner will provide keying requirements for hotel system.

4. Locksets and cylinders shall contain 6-pin tumblers.

5. Furnish the following quantities of keys:

a. Grandmaster Keys (GMK) 10 each

b. Master Keys (each MK set) 5 each

c. Change Keys per lock 3 each

d. Keyed alike sets (each set) 4 each

e. Removable core control keys 4 each

6. Hotel System-Master Keying: Coordinate with Owner based upon the following general requirements.

a. Administrative Master Key "AA" - Operates all locks in the administrative and office areas of the hotel.

b. Engineering Master Key "AB" - Operates all locks in the engineering and maintenance areas, (i.e., engineer's office, entire maintenance section, mechanical and electrical rooms, utility closets, janitors closets, and all exterior doors, including the roof).

c. Food and Beverage Master Key "AC" - Operates all locks under the direct supervision of the steward, (i.e. kitchen, banquet rooms, food storage rooms, dining rooms and kitchen offices).

d. Housekeeping Master Key "AD" - Operates all locks under the direct supervision of the housekeeper, (i.e., housekeeper's office, pantries, linen rooms and linen chutes on guest floors and laundry room area).

e. Health and Exercise Master Key "AE" - Operates all locks in the health/exercise areas, (i.e., swimming pool, exercise room, pool lockers and game room).

f. Grand Master Key “A” – Operates locks as noted in paragraphs a through e above. Upon authorization of the Owner, keyblanks shall be sold only by direct main from the door lock manufacturer.

g. Keyed alike in sets, each set different.

1) Electrical and telephone closets.

2) Two or more doors to or from the same room area or space.

3) Public meeting room doors in accordance to areas subdivided by operable partitions.

4) Linen rooms and chute area doors.

B. Hotel System - Temporary Construction Keying:

1. Furnish temporary construction keying for use during construction. Prior to Owner occupancy of the building, the General Contractor with the Owner's Representative shall void out the construction keys.

2. Furnish 25 Construction Master Keys.

C. Key Control Box:

1. "RWC Series"; Telkee, Inc., (302-678-7800). Wall mounted lockable key cabinet complying with ANSI/BHMA A156.5.

2. Size: Sized for actual quantities of keys, plus 25%, plus additional capacity for 12 housekeeper pouches.

3. One wall mounted lockable key cabinet for four (4) key rings.

4. One key control log book.

5. Color coded and numbered tags for ring identification.

2.06 HARDWARE MANUFACTURERS

Hardware Item	Base Manufacturer	Acceptable Equivalents
Hinges	McKinney	Stanley, Hager
Lockset (Standard)	Sargent	Schlage, Yale (Must match Elec. lock lever)
Lockset (Sliding Door)	Adams Rite	NONE
Electronic Lockset System	VingCard	Onity, Saflok
Cylinders	Sargent	Schlage, Yale
Exit Devices	Sargent	Von Duprin, Yale
Closer (Except Concealed & Electro)	Norton	LCN, Sargent, Yale
Closer (Concealed)	Rixson	LCN, Sargent, Yale
Dust-Proof Strikes	Rockwood	Ives, McKinney Trimco
Electric Strikes	Folger Adam	Locknetics, HES
Electromagnetic Hold-Open	Rixson	Architectural Builders Hardware, Sargent
Electronic Locks, Power Supplies & Accessories	Securitron	Locknetics
Door Stops	Rockwood	Trimco, Ives, McKinney
Door Viewers	Rockwood	Ives, McKinney
Door Guard	Rockwood	Ives, McKinney
Kick Plates	Rockwood	Trimco, Ives, McKinney
Door Sensor	Pulnix	NONE
Weatherstrip, Door Sweeps, Thresholds, Astragals	Pemko	NGP, McKinney
Push/Pulls	Rockwood	Trimco, Ives, McKinney
Pulls(GR Bath Sliding Doors)	Rixson	Hafele
Overhead Stops	Rixson	Architectural Builders Hardware, Sargent
Sliding Door Hardware	Pemko/Henderson	Hafele, Johnson
Key Box	Telkee	NONE

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that doors and frames are ready to receive work and dimensions, are as indicated on Shop Drawings, and as instructed by the manufacturer.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install each hardware item in compliance with manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finished, reinstall each item. Do not install surface-mounted items until finishes have been completed on the substrate.

A. Conform to ICC/ANSI A117.1-2003 for positioning requirements for the Disabled.

B. All door closers shall be installed out of public sight wherever possible.

3.03 FASTENINGS

A. Suitable size, quantity, and material with finish to match the hardware.

B. Machine screws for attaching hardware to metal.

C. Self-tapping screws for attaching kickplate to hollow metal or wood mineral core doors.

D. Full thread type screws for attaching butt hinges to wood or mineral core doors.

E. Sex bolts and sleeves for attaching surface closers or arm to mineral core doors.

F. Non-ferrous or corrosion resistant steel fasteners for items exposed to weather.

3.04 HARDWARE LOCATIONS

A. Hardware mounting heights shall conform to the following unless otherwise indicated on the drawings.

1.	Hinges:	Top - 5" from head to top of hinge leaf.
		Bottom - 10" from bottom of hinge to finished floor. Intermediates.
		Intermediates - Equal distance between top and bottom hinges (Maximum 3'-0")
2.	Card Readers:	40" from finish floor to centerline
3.	Locks/Latches:	38" from finish floor to center of lock/latch.
4.	Deadlocks/Deadbolts:	48" from finished floor to center of cylinder.
5.	Door Guards:	60" from finished floor to center line.
		At Accessible Guest Rooms maximum 48" from finished floor to center line.
6.	Door Viewer:	57" from finished floor to center line.
		At Accessible Guest Rooms, provide two door viewers with mounting heights at 45" and 57" from finish floor to centerline.
7.	Doorpulls, Pushplates	Guest Room Bath/Toilet Pull – 38” from finish floor to

	Pushbars:	centerline. All other doors - 45" from finish floor to centerline.
8.	Exit Device Crossbars:	38" from finish floor to center of crossbar.
9.	Electromagnetic Hold-Open:	Set wall mounted type 72" from finish floor to centerline. Wall mounted templates shall be issued by hardware supplier.

3.05 HARDWARE INSTALLATION

A. Coordination:

1. Fit and adjust hardware in accordance with manufacturer's packaged instructions.
2. Coordinate installation with all trades, millwork, finish hardware, door frames and electrical.

B. Sound and Smoke Seals:

1. Install tape on frame stop at head, on frame stop at lockset jamb, and on rabbit at hinge jamb.
2. Install tape on astragal of double doors.

C. Door Viewers: 180 degree viewers at Guest Room doors.

D. Door Guards: Guest Room entry door guards shall have strike plate furnished standard with door guard.

3.06 ADJUSTING

A. Adjustments:

1. Weatherstripping and sound/smoke seals shall not interfere with operation of doors and shall be adjusted accordingly.
2. Secure door bottom in strict accordance with manufacturer's printed instructions and as required to seal door to threshold.
3. Door seals to provide intended functions. Replace seals which do not perform.
4. Adjust door so that lockset can be easily opened with a key/card key without binding between the latchbolt and strike. Doors too tight (or too loose) will not be accepted.
5. Clearances between door and frame, at jambs and head: No greater than 1/8" +/- 1/16".
6. Prior to Owner's "soft opening" replace Guest Room battery power supply units with new alkaline batteries.

3.07 PROTECTION

A. Reinstall wrappings furnished by manufacturer for protecting items such as levers, handles and pulls.

B. Do not remove manufacturer's protective covering of flat items such as kickplates and push plates until just prior to final acceptance of the building.

3.08 CLEANING

A. After installation, clean metal surfaces on both interior and exterior of all mortar, plaster, paint and other contaminants. After cleaning, protect work against damage.

3.09 FINAL ADJUSTMENT

A. Whenever hardware is installed more than one month prior to acceptance or occupancy of a space or area, return during the week prior to acceptance or occupancy and make a final check and adjustment of all hardware items in such space or area.

B. At the completion of the project, manufacturers' suppliers or representatives shall inspect their hardware and make any corrections required due to errors or improper installation.

PART 4 HARDWARE SCHEDULE

4.01 HW SET - 1 GUESTROOM ENTRY (115 DEGREE SWING)

SINGLE DOOR (1)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X ADB X WING	US26D	VING
1 EA	CLOSER	1703BC X COV (180°)	US26D	NOR
1 EA	DOOR GUARD	PDL	US26D	PEM
1 EA	DOOR VIEWER	622	US26D	RO
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM
1 EA	AUTO DOOR BOTTOM	411APKL (ROUTED INTO BOTTOM OF DOOR)		PEM

NOTE: AT GUESTROOM ENTRY HARDWARE SETS 1 & 1A, FURNISH A 2 SERIES CONCEALED OVERHEAD STOP BY RIXSON, IN LIEU OF THE WALL STOP, AT ROOMS WITH COMMUNICATING DOORS. TEMPLATE FOR MAXIMUM OPENING SWING WITHOUT CONTACTING ADJACENT DOOR.

4.02 HW SET – 1A GUESTROOM ENTRY (90 DEGREE SWING)

SINGLE DOOR (1B)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X ADB X WING	US26D	VING
1 EA	CLOSER	1703BC X COV (180°)	US26D	NOR
1 EA	DOOR GUARD	PDL	US26D	PEM
1 EA	DOOR VIEWER	622	US26D	RO
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM
1 EA	AUTO DOOR BOTTOM	411APKL (ROUTED INTO BOTTOM OF DOOR)		

NOTE: AT GUESTROOM ENTRY HARDWARE SETS 1 & 1A, FURNISH A 2 SERIES CONCEALED OVERHEAD STOP BY RIXSON, IN LIEU OF THE WALL STOP, AT ROOMS WITH COMMUNICATING DOORS. TEMPLATE FOR MAXIMUM OPENING SWING WITHOUT CONTACTING ADJACENT DOOR.

4.03 HW SET - 2 ACCESSIBLE GUESTROOM ENTRY (115 DEGREE SWING)

SINGLE DOOR (1A)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X ADB X WING	US26D	VING
1 EA	CLOSER	8501BF (180°)	US26D	NOR
1 EA	DOOR GUARD	PDL	US26D	PEM
2 EA	DOOR VIEWERS	622	US26D	RO
1 EA	OVERHEAD STOP	10-436	US26D	RIX
1 SET	DOOR SEALS	S88D		PEM
1 EA	AUTO DOOR BOTTOM	411APKL (ROUTED INTO BOTTOM OF DOOR)		PEM

4.04 HW SET – 2A ACCESSIBLE GUESTROOM ENTRY (90 DEGREE SWING)

SINGLE DOOR (1C)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X ADB X WING	US26D	VING
1 EA	CLOSER	8501BF (180°)	US26D	NOR
1 EA	DOOR GUARD	PDL	US26D	PEM
2 EA	DOOR VIEWERS	622	US26D	RO
1 EA	OVERHEAD STOP	10-436	US26D	RIX
1 SET	DOOR SEALS	S88D		PEM
1 EA	AUTO DOOR BOTTOM	411APKL (ROUTED INTO BOTTOM OF DOOR)		PEM

4.05 HW SET – 3A GUEST TOILET

SINGLE DOOR (2)
EACH DOOR TO HAVE

1 SET	DOOR PULLS	M83708 (9 INCH C TO C) 2 PULLS MTD BACK TO BACK	US26D	RO
1 EA	SLIDING DOOR UPPER TRACK KIT	SHS80 / 6; 941.00.200X (2 METER)		PEM, HAF

NOTE: SLIDING DOOR TRACK KIT CONSISTS OF THE FOLLOWING:

1 EA	*SLIDING DOOR*	*H225 FITTING SET*	PEM
1 EA	*UPPER TRACK*	*280A72*	PEM
1 EA	*WALL MOUNTED*	*102WN GUIDE*	PEM
2 EA	*TRACK STOPPER*	*601H*	PEM

4.06 HW SET – 3B GUEST BATH

SINGLE DOOR (3)
EACH DOOR TO HAVE

1 SET	DOOR PULLS	M83708 (9 INCH C TO C) 2 PULLS MTD BACK TO BACK	US26D	RO
1 EA	SLIDING DOOR UPPER TRACK KIT	SHS80 / 6; 941.00.200X (2 METER)		PEM, HAF

NOTE: SLIDING DOOR TRACK KIT CONSISTS OF THE FOLLOWING:

1 EA	*SLIDING DOOR*	*H225 FITTING SET*	PEM
1 EA	*UPPER TRACK*	*280A72*	PEM
1 EA	*WALL MOUNTED*	*102WN GUIDE*	PEM
2 EA	*TRACK STOPPER*	*601H*	PEM

4.07 HW SET - 4 QUEEN / QUEEN GUESTROOM CLOSET

SINGLE DOOR (5)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	DOOR PULLS	RM83708 (9 INCH C TO C)	US32D	RO
1 EA	ROLLER LATCH	RL1	US26D	MCK
1 EA	OVRHD STOP	10-436	630	RIX
3 EA	SILENCERS	S1M		MCK

4.08 HW SET - 5 COMMUNICATING DOORS

SINGLE DOOR (4)
EACH DOOR TO HAVE:

2 EA	SPRING HINGES	1502 4.5 X 4.5	US26D	MCK
1 EA	HINGE	TA2714 4.5 X 4.5	US26D	MCK
1 EA	COMM LOCKSET	28-7G15-3 LL	US26D	SAR
1 EA	DEADBOLT	489	US26D	SAR
1 EA	OVERHEAD STOP	10-436	US26D	RIX
1 EA	AUTO DOOR BOT	434APKL	US27	PEM
1 SET	DOOR SEALS	S88D		PEM

4.09 HW SET - 8 TYPICAL INTERIOR STAIR DOORS

SINGLE DOOR (35)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	PASSAGE SET	28-10U15 LL	US26D	SAR
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

4.10 HW SET – 8A LOUNGE FROM PATIO

SINGLE DOOR (46, 48)
EACH DOOR TO HAVE:

1 EA	OH CONCEALED CLOSER	0608090N x LCP	690	RIX
1 EA	EXIT LOCK TRIM	CLASSIC X WING LESS ADB	US26D	VING
1 EA	FLOOR STOP	483	625	RO
1 EA	HEAD SEALS	347A		PEM

NOTE: CONTINUOUS HINGES, THRESHOLD, AND DOOR SEALS FURNISHED BY DOOR SUPPLIER.

4.11 HW SET - 9 TYPICAL EXTERIOR STAIR DOORS

SINGLE DOOR (40)
EACH DOOR TO HAVE:

3 EA	HINGES	T43386 5 X 4.5 NRP	US32D	MCK
1 EA	CLOSER	UNI-8501BF	689	NOR
1 EA	EXIT DEVICE	8510	US32D	SAR
1 EA	DRIP CAP	346 C		PEM
1 EA	THRESHOLD	171A		PEM
1 EA	DOOR SWEEP	345 AV		PEM
1 EA	WEATHERSTRIP	303 AV SET		PEM

4.12 HW SET - 10 VESTIBULE CORRIDOR DOORS

SINGLE DOOR (34)
EACH DOOR TO HAVE:

1 EA	OH CONCEALED CLOSER	0608090N X LCP	US26D	RIX
1 EA	EXIT DEVICE	8510 LESS TRIM	US32D	SAR
1 EA	ELEC STRIKE	9400	US32D	HES
1 EA	EXIT LOCK TRIM	CLASSIC X WING LESS ADB	US26D	VING
1 EA	WALL STOP	409	US26D	RO
1 EA	DOOR LOOP	3261		SAR
1 EA	POWER SUPPLY	3520		SAR

NOTE: CONTINUOUS HINGES, THRESHOLD & DOOR SEALS BY DOOR MANUFACTURER. TIED TO PUSH BUTTON RELEASE AT FRONT DESK.

4.13 HW SET – 10A EXTERIOR CORRIDOR DOORS

SINGLE DOOR (41)
EACH DOOR TO HAVE:

1 EA	OH CONCEALED CLOSER	0608090N X LCP	US26D	RIX
1 EA	FLOOR STOP	483	US26D	ROC
1EA	HEAD SEALS	347A		PEM

NOTE: CONTINUOUS HINGES, PUSH/PULL SET, THRESHOLD & DOOR SEALS BY DOOR MANUFACTURER

4.15 HW SET – 12A VESTIBULE FROM POOL

SINGLE DOOR (09)
EACH DOOR TO HAVE:

1 EA	OH CONCEALED CLOSER	0608090N X LCP	US26D	RIX
1 EA	WALL STOP	409	US26D	RO

NOTE: CONTINUOUS HINGES, PUSH/PULL SET, THRESHOLDS & DOOR SEALS BY DOOR MANUFACTURER

4.16 HW SET - 13 EXTERIOR MAIN ENTRY AND REAR ENTRY VESTIBULE

PAIR DOORS (39, 43)
EACH PAIR TO HAVE:

NOTE: AUTOMATIC DOOR HARDWARE FURNISHED BY DOOR MANUFACTURER

4.17 HW SET - 14 INTERIOR MAIN ENTRY AND REAR ENTRY VESTIBULE

PAIR DOORS (06) (07)
EACH PAIR TO HAVE:

1 EA	REMOTE CONTROL UNIT WITH POWER SUPPLY	REMOTE CONTROLLER	US26D	VING
1 EA	PUSH BUTTON RELEASE	MUSHROOM BUTTON		VING
1 EA	KEYSWITCH	4370L	US26D	SAR
1 EA	CYLINDER @ KEYSWITCH	41	US26D	SAR

NOTE: AUTOMATIC DOOR HARDWARE & ACCESSORIES BY DOOR MANUFACTURER. TIED TO PUSH BUTTON RELEASE AT FRONT DESK.

4.18 HW SET - 15 POOL

SINGLE DOOR (08)
EACH DOOR TO HAVE:

1 EA	OH CONCEALED CLOSER	0608090N X LCP	US26D	RIX
1 EA	FLOOR STOP	483	US26D	ROC
1 EA	LOCK	CLASSIC X WING LESS ADB STAINLESS STEEL OR NON-CORROSIVE HARDWARE AT POOL.	US26D	VING
1 EA	WALL STOP	409	US26D	RO

NOTE: CONTINUOUS HINGES, PULLS, THRESHOLDS & DOOR SEALS BY DOOR MANUFACTURER. PROVIDE STAINLESS STEEL OR NON-CORROSIVE HARDWARE AT POOL.

4.19 SET - 16 GUEST LAUNDRY

SINGLE DOOR (31)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X WING LESS ADB	US26D	VING
1 EA	CLOSER	8501BF(90°)	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

4.20 SET – 16A EXERCISE ROOM

SINGLE DOOR (10)
EACH DOOR TO HAVE:

1 EA	LOCK	CLASSIC X WING LESS ADB	US26D	VING
1 EA	OH CONCEALED CLOSER	0608090N X LCP	US26D	RIX
1 EA	WALL STOP	409	US26D	RO

NOTE: CONTINUOUS HINGES, THRESHOLDS & DOOR SEALS BY DOOR MANUFACTURER

4.21 HW SET - 17 ELECTRICAL / PBX /CATV / LINEN / LAUNDRY STORAGE

SINGLE DOOR (30) (32) (38)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X WING LESS ADB	US26D	VING
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

NOTE: HANDICAP WARNING (76) ONLY ON MECHANICAL/ELECTRICAL ROOMS

4.22 HW SET – 17A ELEC OVER 1200 AMP

SINGLE DOOR (45)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	EXIT DEVICE	12-8504 LESS TRIM	US32D	SAR
1 EA	EXIT LOCK TRIM	CLASSIC X WING LESS ADB	US26D	VING
1 EA	CLOSER	8501BF(180°)	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

4.23 HW SET – 18 MECHANICAL

SINGLE DOOR (19)
EACH DOOR TO HAVE:

3 EA	HINGES	T4A3786 5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X WING LESS ADB	US26D	VING
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

NOTE: HANDICAP WARNING (76) ONLY ON MECHANICAL/ELECTRICAL ROOMS

4.24 HW SET – 19 DATA CABINET AT WORKROOM 113

SLIDING BI-PASS DOORS (28)
EACH SET (3 DOOR LEAVES) TO HAVE:

6 EA	FLUSH PULLS	872	630	RO
1 EA	TRACK	200 X 1050		JOHN
3 EA	BOTTOM GUIDE	1705		JOHN
6 EA	BALLBEARING HANGERS	2020		JOHN
6 EA	BOTTOM DOOR GUIDES	1705		JOHN

4.25 HW SET – 22A FOOD PREP FROM CORRIDOR

SINGLE DOOR (18)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	KEYPAD LOCK	SABL-10	US26D	SEC
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	KICKPLATE	K1050 8” X 2” LDW	US26D	RO
1 EA	FLOOR STOP	482	US26D	RO
3 EA	SILENCERS	608		RO

4.26 HW SET - 23 BOARD ROOM

SINGLE DOOR (11)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	LOCKSET	CLASSIC X WING LESS ADB	US26D	VING
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	OVERHEAD STOP	10-436	US26D	RIX
1 EA	DOOR VIEWER	622	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

NOTE: PROVIDE VIEWER TO BE MOUNTED WITH VIEW IN FROM CORRIDOR.

4.27 HW SET – 23A MEETING ROOM

PAIR DOORS (50)
EACH DOOR TO HAVE:

6 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
2 EA	FLUSHBOLT	555 / 557	US26D	RO
1 EA	LOCKSET	CLASSIC X WING LESS ADB	US26D	VING
1 SET	DUMMY TRIM	WING	US26D	VING
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	C.OH STOP	2 SERIES	US32D	RIX
1 EA	DOOR VIEWER	622	US26D	RO
1 EA	DUST STRIKE	570	US26D	RO
1 EA	ASTRAGAL SEAL	S88D		PEM
1 SET	DOOR SEALS	S88D		PEM

NOTE: PROVIDE VIEWER TO BE MOUNTED ON ACTIVE LEAF WITH VIEW IN FROM CORRIDOR.

4.28 HW SET – 25 POOL EQUIPMENT (INDOOR POOL)

SINGLE DOOR (26)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2314 4.5 X 4.5	US26D	MCK
1 EA	LOCKSET	76-28-10G04 LL	US26D	SAR
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	THRESHOLD	172A	US27	PEM
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM
1 EA	DOOR SWEEP	315CN	US28	PEM
1 EA	OH DOOR WEATHERSTRIP	347A		PEM

NOTE: PROVIDE STAINLESS STEEL OR NON-CORROSIVE HARDWARE AT POOL.

4.29 HW SET - 26 MEN/WOMEN TOILET

SINGLE DOOR (20)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26	MCK
1 EA	PUSH/PULL	70C / 111 x 70C	US26	RO
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
1 EA	KICKPLATE	K1050 8” X 2” LDW	US26D	RO
3 EA	SILENCERS	608		RO

4.30 HW SET - 28 OFFICES

SINGLE DOOR (13) (16)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	LOCKSET	CLASSIC X WING LESS ADB	US26D	VING
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
3 EA	SILENCERS	608		RO

4.31 HW SET - 29 EXTERIOR MEETING ROOM AND BOARD ROOM

SINGLE DOORS (54)
EACH DOOR TO HAVE:

3 EA	HINGES	T43386 4.5 X 4.5 NRP	US32D	MCK
1 EA	LOCK	CLASSIC X WING LESS ADB	US26D	VING
1 EA	EXIT DEV.	8510 (EXIT ONLY)	US32D	SAR
1 EA	OH CLOSER (Push Side)	CPS-7500	689	NOR
1 EA	THRESHOLD	172A	US27	PEM
1 EA	DOOR SWEEP	315CN	US28	PEM
1 SET	DOOR SEALS	S88D		PEM
1 EA	OH DOOR WEATHERSTRIP	347A X 68R		PEM

4.32 HW SET - 30 LAUNDRY FROM CORRIDOR

SINGLE DOOR (14)
EACH DOOR TO HAVE:

3 EA	HINGES	T4A786 5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X WING LESS ADB	US26D	VING
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	KICKPLATE	K1050 8” X 2” LDW	US26D	RO
1 EA	WALL STOP	409	US26D	RO
1 EA	WALL MAGNET	FM998	US26D	RIX
1 SET	DOOR SEALS	S88D		PEM

4.33 HW SET – 30A LAUNDRY FROM CORRIDOR

SINGLE DOOR (37)
EACH DOOR TO HAVE:

3 EA	HINGES	T4A786 4.5 X 4.5	US26D	MCK
1 EA	LOCK	CLASSIC X WING LESS ADB	US26D	VING
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	S-OH STOP	9 SERIES	US32D	RIX
1 EA	KICKPLATE	K1050 8” X 2” LDW	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

4.34 HW SET - 31 EMPLOYEE DINING / WORKROOM / BUILDING ENGINEER / STORAGE

SINGLE DOOR (12) (24) (27) (44) (49) (52) (53)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	KEY PAD LOCK	KP8278 LNA	US26D	SAR
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

4.35 HW SET - 32 EMPLOYEE TOILET

SINGLE DOOR (23)
EACH DOOR TO HAVE:

3 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 EA	PRIVACY SET	28-10U65 LL	US26D	SAR
1 EA	CLOSER	8501BF	US26D	NOR
1 EA	WALL STOP	409	US26D	RO
1 SET	DOOR SEALS	S88D		PEM

4.36 HW SET - 33 CORRIDOR BACK OF HOUSE

SINGLE DOOR (33)
EACH DOOR TO HAVE:

3 EA	HINGES	T2714 4.5 X 4.5	US26D	MCK
1 EA	KEYPAD LOCK	SABL-10	US26D	SEC
1 EA	CLOSER	8501	689	NOR
1 EA	WALL STOP	409	US26D	RO
2 EA	PLATE	K1050 8” X 2” LDW	US32D	RO
3 EA	SILENCERS	608		RO

4.37 HW SET – 33A SOUTH STAIR FIRST FLOOR INTERIOR DOOR ONLY

SINGLE DOOR (57)
EACH DOOR TO HAVE:

3 EA	HINGES	T2714 4.5 X 4.5	US26D	MCK
1 EA	KEYPAD LOCK	SABL-10	US26D	SEC
1 EA	CLOSER	8501	689	NOR
1 EA	WALL STOP	409	US26D	RO
2 EA	PLATE	K1050 8” X 2” LDW	US32D	RO
1 SET	DOOR SEALS	S88D		PEM

4.38 HW SET - 34 MEETING ROOM / TOILET ROOM CLOSET / ELEV. EQUIPMENT ROOM

SINGLE DOOR (25) (51)
EACH DOOR TO HAVE:

3 EA	HINGES	T2714 4.5 X 4.5	US26D	MCK
1 EA	LOCK SET	28-10G37 LL	US26D	SAR
1 EA	WALL STOP	409	US26D	RO
3 EA	SILENCERS	608		RO

4.40 HW SET - 35 FOOD PREP - DOUBLE ACTING

SINGLE DOOR (56)
EACH DOOR TO HAVE:

1 SET	DEAD BOLT	487	US26D	SAR
1 EA	Concealed Closer	MW806 x 199	626	RX
2 EA	PUSH PLATE	70C 4 X 16	US32D	RO
2 EA	KICK PLATE	K1050 8" X 2" LDW	US32D	RO
2 EA	FLOOR STOP	482	US26D	RO

4.41 HW SET - 36 CROSS CORRIDOR DOORS

PAIR DOORS (29)
EACH PAIR TO HAVE:

6 EA	HINGES	TA2714 4.5 X 4.5	US26D	MCK
1 SET	AUTO BOLT	1960	US26D	RO
1 SET	COORDINATOR	NX1654 X 1601	600	RO
1 EA	EXIT DEVICE	12 NB WD-8615 ETL	US32D	SAR
2 EA	CLOSER	8501ST	US26D	NOR
2 EA	WALL STOP	409	US26D	RO
2 EA	WALL MAGNET	FM998	698	RIX
1 SET	DOOR SEALS	S88D		PEM
1 EA	ASTRAGAL SEAL	S88D		PEM

NOTE: WALL MAGNETS TO BE TIED INTO FIRE ALARM SYSTEM

4.42 HW SET - 37 DRYERS

SINGLE DOOR (15)
EACH DOOR TO HAVE:

3 EA	HINGES	T2714 4.5 X 4.5	US26D	MCK
1 EA	PASSAGE SET	28-65U15 KL	US26D	SAR
1 EA	WALL STOP	409	US26D	RO
3 EA	SILENCERS	608		RO

4.43 HW SET - 38 EXTERIOR MECH & SHED

SINGLE DOORS (42) (47)
EACH DOOR TO HAVE:

3 EA	HINGES	T43386 5 X 4.5 NRP	US32D	MCK
1 EA	LOCKSET	28-10G04 LL	US26D	SAR
1 EA	LATCH GUARD	320CL	US32D	ROC
1 EA	OH CLOSER (Push Side)	CPS-8501-T	689	NOR
1 EA	THRESHOLD	172A	US27	PEM
1 EA	DOOR SWEEP	315CN	US28	PEM
1 SET	DOOR SEALS	S88D		PEM
1 EA	OH DOOR WEATHERSTRIP	347A X 68R		PEM

4.44 HW SET - 40 EXTERIOR EMPLOYEE ENTRY

SINGLE DOORS (55)
EACH DOOR TO HAVE:

3 EA	HINGES	T43386 4.5 X 4.5 NRP	US32D	MCK
1 EA	EXIT DEVICE	8504 ETL	US32D	SAR
1 EA	ELECT STRIKE	9600 X 2004m	US32D	HES
1 EA	CONTROLLER	2005M		HES
1 EA	POWER SUPPLY	3520		SAR
1 EA	WIRE HARNESS	QC-C1500P		MCK
1 EA	OH CLOSER	UNI-8501	689	NOR
1 EA	ARMOR KICK	K1050 34 " X 2" LDW	US32D	ROC
1 EA	THRESHOLD	172A	US27	PEM
1 EA	DOOR SWEEP	345AV		PEM
1 SET	DOOR SEALS	303 AV		PEM
1 EA	KEYPAD	DK-26SS		SEC

4.45 HW SET - 44 TOILET STALLS/ACCESSIBLE TOILET STALLS

SINGLE DOOR (21) (22)
EACH DOOR TO HAVE

3EA	HINGES	TA2314 4.5 X 4.5	US26D	MCK
1EA	PRIVACY SET	28-10U65 LL	US26D	SAR
1EA	WALL STOP	409	US26D	RO
1EA	SILENCERS	608		RO

4.46 HW SET - 45 CLOSET BI-FOLD

4-DOOR SET (17)
EACH SET TO HAVE

1EA	BIFOLD HARDWARE SET	HF4/100A		PEM
2EA	WIRE PULL	853	US26D	RO

4.47 HW SET 46 ELEVATOR DOORS

SINGLE DOOR (36)
EACH DOOR TO HAVE

NOTE: ALL HARDWARE FURNISHED BY ELEVATOR MANUFACTURER

END OF SECTION

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SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Types of work in this Section include glass and glazing for:
    a. Float Glass.
    b. Tempered Glass.
    c. Insulated Units.
    d. Laminated Glass (Interior Displays/Casework).
    e. Decorative Laminated Glass.
    f. Decorative Film Overlay.
    g. Mirror.
    h. Glazing for aluminum windows specified under Section 08 51 13.

B. Related Sections:

1. Section 06 20 00 – Finish Carpentry
2. Section 07 92 00 - Joint Sealants
3. Section 08 11 13 – Hollow Metal Doors and Frames
4. Section 08 14 00 - Wood Doors
5. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts
6. Section 08 42 29 - Automatic Entrance Doors
7. Section 08 51 13 - Aluminum Windows
8. Section 12 30 00 – Architectural Woodwork

1.02 REFERENCES

A. American Architectural Manufacturers Association (AAMA) Publications:

1. 800-92 “Voluntary Specifications and Test Methods for Sealants”

B. American National Standards Institute (ANSI) Publications:

1. ANSI/AAMA 101 "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors"
2. Z97.1 "Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings"

C. ASTM International (ASTM) Publications:

1. C920 “Standard Specification for Elastomeric Joint Sealants”
2. C1036 “Standard Specification for Flat Glass”
3. C1048 “Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass”
4. C1172 “Standard Specification for Laminated Architectural Flat Glass”

5. C1376 “Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass”
6. E774 “Standard Specification for Sealed Insulating Glass Units”
7. E1300 “Standard Practice for Determining Load Resistance of Glass in Buildings”

D. Consumer Product Safety Commission (CPSC) Publications:

1. 16 CFR 1201 - “Safety Standard for Architectural Glazing Materials “

E. Glass Association of North America (GANA)

1. "GANA Glazing Manual"
2. "FGMA Sealant Manual"

F. Insulating Glass Manufacturers Alliance (IGMA) Publications:

1. SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units"

G. National Glass Association (NGA)

1. Glazier Certification Program

H. Underwriter's Laboratories, Inc. (UL) Standards:

1. 10C "Positive Pressure Fire Tests of Door Assemblies"

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Submit manufacturer's technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.
2. Compatibility and Adhesion Test Report: Submit statement from sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants and interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.

B. Samples: Submit, for verification purposes, 12" square samples of each type of glass indicated except for clear single pane units, and 12" long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative of adjoining framing system in color. Sample requirement may be waived by Owner’s Representative at their discretion.

C. LEED Submittals:

1. Product Data for Credit EQ 4.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.

1.04 QUALITY ASSURANCE

A. Glazing Standards: Comply with recommendations of the Glass Association of North America (GANA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 .

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council (SGCC) or another certification agency acceptable to authorities having jurisdiction.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

E. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

1.06 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1.07 WARRANTY

A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

B. All material shall be free from manufacturer defects and installation workmanship. Any material or workmanship judged to be defective shall be replaced at no cost to the Owner.

C. Insulating glass units shall be jointly guaranteed for a period of ten (10) years by the manufacturer and installer against obstruction of vision between interior glass surfaces caused by failure of the hermetic seal. Units damaged during guarantee period shall be replaced at no cost to the Owner.

PART 2 PRODUCTS

2.01 ACCEPTABLE GLASS MANUFACTURERS

A. All glass shall be new material, graded under ASTM 1036.

B. All glass in related area shall be from one manufacturer.

2.02 GLASS MATERIALS

A. Refer to Drawings for location of glass.

B. Glass I: Clear Float Glass: ASTM C1036, Type 1 (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), as manufactured by one of the following:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. PPG Industries (800-377-5267)

b. Pilkington North America (800-221-0444)

c. AGC Flat Glass North America (800-251-0441)

d. Guardian Industries (248-340-1800)

C. Glass II: Tempered Glass: 1/4", Condition A (uncoated surfaces), Type 1 (transparent glass, flat), Class 1 (clear), Quality q3, clear, fully tempered safety glass.

1. All tempered glass shall conform ASTM C1048, and Federal Standard CPSC 16 SFR 1201. Tempered glass shall bear permanent monogram indicating tempered quality. Fabrication marks on tempered glass shall be located to be concealed in completed installation.

2. Color: Clear to match aluminum windows glazing, Section 08 51 13.

3. Approved Manufacturers:

a. PPG Industries (800-377-5267)

b. Pilkington North America (800-221-0444)

c. AGC Flat Glass North America (800-251-0441)

d. Guardian Industries (248-340-1800)

D. Glass III: Coated Low Emissitivity Glass: 1/4", Condition C (other coated glass), Type I (transparent glass, flat), Class I (clear), Quality q3 (glazing select), with coating type and performance characteristics complying with requirements specified below:

1. Low E Coating: surface #2 on insulated units.

2. Avendra, LLC Preferred Manufacturers:

a. None

3. Approved Manufacturers:

a. "Solarban 60 Solar Control Low-E Glass"; PPG Industries (800-377-5267)

b. "Comfort Ti-AC-40"; AGC Flat Glass North America (800-251-0441)

c. “Sunguard SN-68”; Guardian Industries (248-340-1800)

d. “Solarscreen 2000 – VE1-2M”; Viracon, Inc. (800-533-2080)

E. Glass IV: Laminated Glass: 1/4", ASTM C1036, Type 1 (transparent glass, flat), Class 1 (clear), as an assembly of two panes bonded together with interlayer and performance characteristics complying with requirements specified below:

1. Interlayer: Polyvinyl butyral (PVB) with a proven record showing no tendency to bubble, discolor or lose physical or mechanical properties after laminating and installation. Fabricator's standard.
   a. Thickness: 0.030 inch
   b. Color/Pattern: Transparent, clear.
2. Fabricate using laminator's standard heat plus-pressure process to produce assemblies free from foreign substances and air/glass pockets.
3. Float glass; clear as indicated.
4. All tempered glass shall conform ASTM C1048, and Federal Standard CPSC 16 SFR 1201. Tempered glass shall bear permanent monogram indicating tempered quality. Fabrication marks on tempered glass shall be located to be concealed in completed installation.
5. Thickness:
   a. Typical: Nominal 1/4 inch thick unit composed of two 1/8" panes plus interlayer.
6. Avendra, LLC Preferred Manufacturers:
   a. None

7. Approved Manufacturers:
   b. PPG Industries (800-377-5267)
   c. Pilkington North America (800-221-0444)
   d. AGC Flat Glass North America (800-251-0441)
   e. Guardian Industries (248-340-1800)

F. Sealed Insulating Glass Units
   1. Avendra, LLC Preferred Manufacturers:
      a. None.
   2. Approved Manufacturers:
      a. Old Castle Glass, a CRH Company (800-899-8455)
      b. Viracon, Inc. (800-533-2080)
      c. AGC Flat Glass North America (800-251-0441)
   3. Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E 774 for performance classification indicated as well as with other requirements specified for glass characteristics, air, space, sealing system, sealant, space material, and desiccants.
      a. Thickness of Each Pane: 1/4".
      b. Air Space Thickness: 1/2".
      c. Exterior Pane of Glass: Glass Type III, tempered in locations shown on Drawings.
      d. Interior Pane of Glass: Glass I, tempered in locations shown on Drawings.
      e. Sealing System: Manufacturer's Standard Dual Seal.
         1) Desiccant: Manufacturer's Standard - Either Molecular Sieve or Silica Gel or Blend of Both.
         2) Spacer Material: Manufacturer's Standard Metal, with Clear Anodized Finish.

2.03 DECORATIVE LAMINATED GLASS

A. Manufacturers:
   1. Avendra, LLC Preferred Manufacturers:
      a. Glass Manufacturers
         1) None.
      b. Interlayer Manufacturer:
         1) None.
   2. Approved Manufacturers:
      a. Glass Manufacturers
         1) Old Castle Glass, a CRH Company (800-899-8455)
         2) Viracon, Inc. (800-533-2080)
      b. Interlayer Manufacturer:
         1) Solutia Inc. (877-674-1233)
         2) Approved Substitution.

B. Translucent Laminated Safety Glass with Decorative Interlayer

1. Glass Materials:

a. Pane Thickness: 1/8-inch.

b. Clear Float Glass: Clear, Type AN - annealed, ASTM C1036.

2. Interlayer Material:

a. Vanceva Design by Solutia, PUB plastic interlayer ASTM C1172.

1) Color: # 0009 Artic Snow.

2) Transparency: Visible Light Transmittance 58%.

3) Thickness: 0.030-inch minimum.

3. Laminated Glass – Safety Type:

a. Nominal Thickness: 1/4 inch.

b. Double layers of 1/8” annealed glass with decorative interlayer between panes.

c. Conform to Safety Regulations: ANSI Z97.1.

2.04 DECORATIVE FILM OVERLAY

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

1. “Fasara”; 3M Consumer Safety and Light Management (800-480-1704)

C. Color and Pattern: Refer to Interior Finish Index.

2.05 MIRRORS

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

1. Binswanger Mirror, Division of Vitro America (800-238-6057)

2. Guardian Consolidated, (276-236-5196)

3. Gardner Glass Products (800-334-7267)

C. Mirror glazing "select" quality float glass complying with ASTM C1036 and CPSC 16 CFR 1201, 1/4" thick.

D. Silvering: Provide electro-deposited silvering in two coats.

E. Exposed edges ground smooth and polished.

F. Mirror sizes indicated on the drawings. Extend mirror to within 1" of adjacent walls, on each end, in one piece.

G. Mirror Adhesive System:

1. Avendra, LLC Preferred Manufacturers:

a. None.

2. Approved Manufacturers:

a. Edge Seal: "UC-4401" - PPG Industries Inc., Glass Group; (800-377-5267) , or as recommended by mirror manufacturer.

b. Adhesive: “Mirror-Mastic”; Palmer Products Corp (800-431-6151)

c. Approved Substitution

H. Exposed Mirror Clips:

1. Avendra, LLC Preferred Manufacturers:

a. None.

2. Approved Manufacturers:

a. Top Clip: 9/16” wide x 1-1/4” long; Model No. 318; Knape & Vogt (800-253-1561)

b. Bottom Clip: Continuous low profile clip at base.

c. Approved substitution.

2.06 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES

A. General: Provide products of type indicated and complying with the following requirements:

1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

2. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for applications indicated and conditions at time of installation.

3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D..

4. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.

5. Colors: Provide color of exposed sealants indicated or, if not otherwise indicated, as selected by Owner’s Representative from manufacturer's standard colors.

B. Preformed Butyl-Polyisobutylene Glazing Tape: Provide manufacturer's standard solvent-free butyl-polyisobutylene formulation with a solids content of 100 percent; complying with AAMA A 804.1; in extruded tape form; non-staining and non-migrating in contact with nonporous surfaces; packaged on rolls with a release paper on one side; with or without continuous spacer rod as recommended by manufacturers of tape and glass for application indicated.

C. Sealants: Provide structural and weatherseal sealants recommended by the manufacturer of the glazing system.

1. As manufactured by the following:

a. GE Silicones (800-255-8886)

b. Tremco, Inc., Sealant/Weatherproofing Division, an RPM Company (800-562-2728)

2. Refer to Section 07 92 00 for requirements.

3. Refer to SUBMITTALS above for required LEED certifications.

D. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Provide the curtain wall manufacturer's permanent non-migrating types compatible with sealants and suitable for joint movement and sealing requirements.

2.07 MISCELLANEOUS GLAZING MATERIALS

A. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

C. Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.

D. Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.

E. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

F. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.

PART 3 EXECUTION

3.01 EXAMINATION: Require Glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Obtain Glazier's written report listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION: Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.03 GLAZING, GENERAL

A. Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.

B. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

D. Anchor components securely in place in the manner indicated. Shim and allow for movement resulting from changes in thermal conditions. Provide separators and isolators to prevent corrosion, electrolytic deterioration, and "freeze-up" of moving joints.

E. Glazing: Inspect glass and framing for compliance with manufacturing and installation tolerances, including size, squareness, and offsets at corners; for existence of minimum face or edge clearances; and for effective sealing of joinery.

1. Avoid point loading of glass. Do not proceed with glazing work until unsatisfactory conditions have been corrected. Do not field-cut glass.

2. Field-Glazed Structural Silicone Glazing Work: Clean frames and glass surfaces with an approved solvent. Prime surfaces and apply structural sealant in accordance with manufacturer's recommendations. Clean excess structural sealant before curing. Mechanically hold glass firmly in place until sealant is sufficiently cured. Install compressible backer rods in joint before applying weatherseal sealant.

F. Erection Tolerances: Install curtain wall components plumb, level, accurately aligned, and located in reference to column lines and floor levels. Erection tolerances indicated below are the maximum allowable for both no-load and full-load conditions and are not cumulative. Adjust work to conform to the following tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment: Limit offset of member alignment to 1/16 inch where surfaces are flush or less than 1/2 inch out of flush and separated by less than 3 inches by protruding work; otherwise limit offsets to 1/8 inch.
4. Location: 3/8 inch maximum deviation from the measured theoretical location of any member at any location.

3.04 GLAZING

A. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6" from corner, unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.

B. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

C. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

D. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated. Force sealants into glazing channels to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.

3.05 DECORATIVE FILM OVERLAY INSTALLATION

A. Preparation: Clean glass in accordance with manufacturer’s recommendations.

B. Apply to glass in accordance with manufacturer’s recommendations. Installation shall be squarely aligned to glass edges and free of air bubbles, tears, wrinkles, and rough edges.

3.06 MIRROR INSTALLATION

A. Do not install mirrors on new plaster, freshly painted walls, or where airborne solvents, heavy-duty cleaners, etc., are in the air. Sub-surfaces shall be allowed to cure for a minimum of 72 hours.

B. Use exposed clips at top and continuous bottom clip at base of mirror.

C. Seal bottom edges of mirror track with clear sanitary sealant. Refer to Section 07 92 00 (07920). Allow to dry.

D. Apply adhesive to 60% of back of mirror.

E. Set mirror supported by setting blocks and press against substrate to ensure bond of adhesive.

F. Hold mirror in place until adhesive fully sets.

3.07 PROTECTION AND CLEANING

A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

E. Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion.

END OF SECTION

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SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Non-Load Bearing Interior Steel Framing
    a. Suspended and Furred Ceilings/Soffits
2. Gypsum Board, Screw-Attached to Wood Framing and Furring Members, and Required Accessories
3. Gypsum Board, Screw-Attached to Steel Framing and Furring Members, and Required Accessories
4. Glass-Mat, Mold & Mildew Resistant Interior Wall Panel
5. Tile-Backer Boards
6. Glass Fiber Reinforced Gypsum.
7. Clothes Dryer Recessed Vent Box.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 06 20 00 - Finish Carpentry
3. Section 07 20 00 - Thermal Protection
4. Section 07 84 00 - Firestopping
5. Section 07 92 00 – Joint Sealants
6. Section 09 21 16.23 - Gypsum Board Shaft-Wall Assemblies
7. Section 09 30 00 – Tiling
8. Section 09 94 13 - Textured Finishing
9. Section 09 51 23 - Acoustical Tile Ceilings
10. Section 09 72 00 – Wall Coverings
11. Section 09 90 00 – Painting
12. Section 13 11 00.02 – Pool-related Vapor Retarder

1.02 REFERENCES

A. AISI "Specification for the Design of Cold Formed Steel Structural Members"

B. ASTM A510 “Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel”

C. ASTM A653 “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process”

D. ASTM A641/A641M “Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire”

E. ASTM C11 “Standard Terminology Relating to Gypsum and Related Building Materials and Systems”

F. ASTM C36 “Standard Specification for Gypsum Wallboard (Withdrawn 2005)”

G. ASTM C475 “Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board”

H. ASTM C514 “Standard Specification for Nails for the Application of Gypsum Board”

I. ASTM C557 “Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing”

J. ASTM C645 “Standard Specification for Nonstructural Steel Framing Members“

K. ASTM C754 “Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products”

L. ASTM C834 “Standard Specification for Latex Sealants”

M. ASTM C840 “Standard Specification for Application and Finishing of Gypsum Board”

N. ASTM C919 “Standard Practice for Use of Sealants in Acoustical Applications”

O. ASTM C954 “Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.112 in. in Thicknes”

P. ASTM C1002 “Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs”

Q. ASTM C1047 “Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base”

R. ASTM C1177 “Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing”

S. ASTM C1178 “Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel”

T. ASTM C1396 “Standard Specification for Gypsum Board”

U. ASTM D3273 “Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber”

V. ASTM E84 “Standard Test Method for Surface Burning Characteristics of Building Materials”

W. ASTM E90 “Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements”

X. ASTM E119 “Standard Test Methods for Fire Tests of Building Construction and Materials”

Y. ASTM E413 “Classification for Rating Sound Insulation”

Z. ASTM E488 “Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements”

AA. ASTM E736 “Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members”

BB. ASTM E 759 “Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members”

CC. ASTM E761 “Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members”

DD. GA-214 “Recommended Levels of Gypsum Board Finish”

EE. GA-216 “Application and Finishing Of Gypsum Panel Products”

FF. GA-505 for definitions of terms for gypsum board assemblies not defined in this Section

GG. GA-600 "Fire Resistance Design Manual"

HH. FM Global (FMG) “Approval Guide, Building Products”

II. UL "Fire Resistance Directory"

JJ. UL 723

KK. United States Gypsum Co. (USG): "Gypsum Construction Handbook"

1.03 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C11 and GA-505 for definitions of terms for gypsum board construction not otherwise defined in this Section or other referenced standards.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00.

B. Submit Product Data for each type of product specified.

C. LEED Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Certificates for Credit MR 5.1: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
    a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
    b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
3. Product Data for Credit EQ 4.1: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.

1.05 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where indicated, provide materials and construction which are identical to those of assemblies whose fire-resistance rating has been determined per ASTM E-119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

1. Provide fire-resistance-rated assemblies identical to those indicated by reference to GA-600 "Fire Resistance Design Manual", to design designations in U.L. "Fire Resistance Directory", to FMG’s “Approval Guide, Building Products”, or in listing of other testing and agencies acceptable to authorities having jurisdiction.

B. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.

C. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

D. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

E. Sound Transmission Characteristics: For gypsum board assemblies indicated to have STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined per ASTM E90 and classified per ASTM E413 by a qualified independent testing agency.

F. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

G. Spray applied textured finish installers shall have successfully completed within last three years, at least three textured coating applications similar in type and size of this project.

1. Mockups: Provide a sample application in one Guest Room for acceptance by the Owner's representative and to serve as a sample standard of quality for the balance of the work. Rework sample room if necessary to obtain Owner's acceptance.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

C. Handle gypsum board to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.07 PROJECT CONDITIONS

A. Environmental Conditions, Gypsum Board, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C840 and with gypsum board manufacturer's recommendations.

B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg. F. For adhesive attachment and finishing of gypsum board maintain not less than 50 deg. F. for 48 hours prior to application and continuously thereafter until drying is complete. Do not exceed 95 deg. F when using temporary heat sources.

C. Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

D. Environmental Conditions, Textured Finish: Comply with manufacturers recommendations as to environmental conditions under which coating can be applied.

E. Maintain temperature at not less than 55 degrees F during installation.

F. Provide adequate ventilation to permit drying during curing.

PART 2 PRODUCTS

2.01 STEEL FRAMING FOR INTERIOR PARTITIONS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. National Gypsum Company (800-628-4662)
2. ClarkWestern Framing Systems (800-543-7140)
3. Dietrich Metal Framing, Inc., A Worthington Industries Company (412-281-2805)

C. General: Provide steel framing members complying with the following requirements:

1. Component Sizes and Spacings: As indicated but not less than that required to comply with ASTM C 754 under the following maximum deflection and lateral loading conditions:

a. Maximum Deflection: L/240 at 5 lb per sq. ft.

b. Protective Coating: G40 Hot-Dip Galvanized Coating per ASTM A653

D. Steel Studs and Runners: ASTM C645, with flange edges of studs bent back 90 deg and doubled over to form 3/16-inch-wide minimum lip (return) and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 22 gauge, unless otherwise indicated.
2. Thickness: 0.0329 inch (20 gauge) as follows:
   a. For head runner, still runner, jamb, and cripple studs at door and other openings.
3. Depth: 2-1/2 inches, unless otherwise indicated.

E. Furring:

1. Steel Rigid Furring Channels: ASTM C645, hat shaped, depth and minimum thickness of base (uncoated) metal to be 0.0179 inch, unless otherwise indicated. Depth of 7/8 inches.
2. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission from steel sheet complying with ASTM A653 or ASTM A568 to form 1/2 inch deep x 2-5/8 inch channel with single or double-leg configuration. Minimum 25 gauge, pre-punched for screw attachment.

F. Deflection Track: Manufacturer's standard top runner designed to prevent cracking of gypsum board applied to interior partitions resulting from deflection of the structure above fabricated from steel sheet complying with ASTM A653 or ASTM A568. Thickness as indicated for studs, and width to accommodated depth of studs.

G. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

H. Flexible Track:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers:
   a. Dietrich Metal Framing, Inc., A Worthington Industries Company (412-281-2805)
   b. FLEX-ABILITY CONCEPTS (405) 996.5343
3. Manufacturer's standard C-shaped flexible steel track with banded flanges and screw attachments at every flange interval fabricated from steel sheet complying with ASTM A653 or ASTM A568.
4. Thickness: Minimum 0.031 inch (20 gage), unless otherwise indicated.

2.02 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

A. Manufacturers of Grid Suspension Systems

1. Avendra, LLC Preferred Manufacturers:
   a. Armstrong World Industries, Inc. (800-442-4212)
2. Approved Manufacturers:
   a. Chicago Metalic Corp. (800-323-7164)
   b. USG Interiors, Inc. (800-950-3839)

B. General: Provide components complying with ASTM C754 for conditions indicated.

C. Grid Suspension System for Interior Ceilings: ASTM C645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross furring members that interlock to form a modular supporting network.

D. Wire for Hangers and Ties: ASTM A641, Class 1 Zinc Coating, Soft Temper, minimum 0.162 inch diameter.

E. Hanger Rods: ASTM A510 mild steel and zinc coated or protected with rust-inhibitive paint. Diameter as indicated.

F. Channels: Cold-rolled steel, 0.0538-inch-minimum thickness of base (uncoated) metal and 1/2-inch-wide flanges, and as follows:

1. Carrying Channels: 2 inches deep, 590 lb. per 1,000 feet, unless otherwise indicated.

2. Furring Channels: 3/4 inch deep, 300 lb. per 1,000 feet, unless otherwise indicated.

3. Finish: G-60 hot-dip galvanized coating per ASTM A653 for framing for toilet rooms, pool extents and where indicated.

a. Rust-inhibitive paint, unless otherwise indicated.

G. Steel Studs for Furring Channels: ASTM C645, with flange edges bent back 90 deg. and doubled over to form 3/16-inch minimum lip (return), minimum thickness of base (uncoated) metal and minimum depth as follows:

1. Thickness: Minimum 0.0179 inch (25 Gage) , unless otherwise indicated.

2. Depth: 1-5/8" inch, unless otherwise indicated.

3. Protective Coating: ASTM A653, G40 Hot-Dip Galvanized Coating per ASTM A525.

H. Steel Rigid Furring Channels: ASTM C645, hat-shaped, depth of 7/8 inch, and minimum thickness of base (uncoated) metal as follows:

1. Thickness: Minimum 0.0179 inch (25 Gage) , unless otherwise indicated.

2. Protective Coating: G40 Hot-Dip Galvanized Coating per ASTM A525.

I. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A653 or ASTM A568 to form 1/2-inch-deep channel of the following configuration:

1. Single-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- wide face connected to flanges by double-slotted or expanded-metal legs (webs).

2.03 GYPSUM BOARD PRODUCTS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. G-P Gypsum Corporation (800-225-6119)

2. National Gypsum Company, Gold Bond Building Products Div. (800-628-4662)

3. United States Gypsum Co. (800-950-3839)

4. CertainTeed Corporation, a subsidiary of Saint-Gobain (800-233-8990)

C. General: Provide gypsum board of types indicated in maximum lengths available that will minimize joints in each area and correspond with support system indicated.

1. Thickness: Provide gypsum board in widths of 48 inches and thickness indicated or, if not otherwise indicated, in 5/8 inch thickness to comply with ASTM C840 for application system and support spacing indicated.

D. Gypsum Wallboard: ASTM C36 or ASTM C1396 and as follows:

1. Type: Type X where required for fire-resistance-rated assemblies.

2. Type: Sag-resistant Type for Ceiling Surfaces

3. Edges: Tapered and Featured (rounded or beveled) for prefilling.

E. Glass-Mat, Mold & Mildew Resistant Interior Wall Panel

1. Glass-Mat, Water Resistant Interior Wall Panel of type and thickness indicated below:

a. Type and Thickness: Type X, 5/8 inch thick, where required for fire-resistance-rated assemblies and where indicated.

2. Avendra, LLC Preferred Manufacturers:

a. None

3. Approved Manufacturers:

a. "DensArmor Plus Interior Guard"; G-P Gypsum Corporation (800-225-6119)

4. ASTM C1177, enhanced mold & mildew resistant gypsum core wallboard. Conforming to the physical properties of ASTM C36 or ASTM C1396 and ASTM C1177 on Glass mat back. Rating of 10 "No Mold Growth" as tested for 4 weeks according to ASTM D3273.

a. Surfaces to be Painted: Coated inorganic glass mat-faced back and paper-faced front.

b. Surfaces to be covered with Wallcovering or other finish: Coated inorganic glass mat-faced back and front.

5. Core: As indicated.

6. Long Edges: Tapered.

F. Flexible Gypsum Wallboard: ASTM C36 or ASTM C1396, manufactured to bend to fit tight radii and to be more flexible than standard regular-type panels of the same thickness.

1. Thickness: 1/4 inch

2. Long Edges: Tapered.

3. Location: On all non-rated decorative, curved walls and soffits. Apply in double layer at curved assemblies.

G. Tile-Backer Boards

1. Glass-Mat, Water-Resistant Gypsum Backing Board: ASTM C1178, of type and thickness indicated below:

a. Type and Thickness: Regular, 1/2 inch thick, unless otherwise indicated.

b. Type and Thickness: Type X, 5/8 inch thick, where required for fire-resistance-rated assemblies and where indicated.

2. Avendra, LLC Preferred Manufacturers:

a. None

3. Approved Manufacturers:

a. “Dens-Shield Tile Guard”; G-P Gypsum Corporation (800-225-6119)

b. “DensArmor Plus” Abuse Resistant Interior Panel”; G-P Gypsum Corporation (800-225-6119)

2.04 TRIM ACCESSORIES

A. Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturer
    a. "Paper Faced Metal Bead and Trim Series" United States Gypsum Co (800-950-3839)
    b. No Substitutions
3. Material: Formed metal combined with paper, with metal complying with the following requirement:
    a. Sheet steel zinc-coated by hot-dip process.
4. Shapes indicated below by reference to Fig. 1 designations in ASTM C1047:
    a. Cornerbead on outside corners, unless otherwise indicated.
    b. LC-bead (J-Bead) with both face and back flanges; face flange formed to receive joint compound. Use LC-beads at exposed panel edges unless otherwise indicated.
    c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
    d. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
    e. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening. Use where indicated.
5. Wall Reveal: Metal edge trims to provide reveal in gypsum board.
    a. Extruded aluminum trim at gypsum board walls or ceilings. Refer to details on Drawings.
    b. Avendra, LLC Preferred Manufacturers:
        1) None
    c. Approved Manufacturer
        1) "SWR-050U-050"; by Pittcon Softforms, LLC (800-637-7638)
        2) "F Reveal Molding DRMF-50-50"; by Fry Reglet Corporation (800-237-9773)
    d. Material:
        1) Reveal Depth: 1/2"
        2) Reveal Width: 1/2"
    e. Color: Factory Primed.
6. Curved Trim: Metal edge trims to provide inside and outside curves.
    a. Flexible metal trim at curved track in gypsum board ceilings. Refer to details on Drawings.
    b. Avendra, LLC Preferred Manufacturers:
        1) None
    c. Approved Manufacturer
        1) "STF Series-Flexible Trim"; by Pittcon Softforms, LLC (800-637-7638)
    d. Material:
        1) Face dimension: 7/8"
        2) Edge dimension: 5/8"

7. Curved Ceiling Reveal Trim: Metal edge trims to provide transition from gypsum board to acoustical ceiling tile system.
    a. Curved anodized aluminum trim at gypsum board ceilings or bulkheads. Refer to details on Drawings.
    b. Avendra, LLC Preferred Manufacturers:
        1) None
    c. Approved Manufacturer
        1) "W Reveal Molding WDM-75-75"; by Fry Reglet Corporation (800-237-9773)
    d. Material:
        1) Reveal Depth: 3/4"
        2) Reveal Width: 3/4"
    e. Color: Match Acoustical Ceiling Tile Grid.

B. Zinc Accessories for Exterior Installations: Corner beads, edge trim, and control joints formed from rolled zinc complying with ASTM C1047, in shapes indicated below by reference to ASTM C1047:
    1. Corner bead on outside corners, unless otherwise indicated.
    2. Shape LC-Bead (J-Bead), use at exposed panel edges, unless otherwise indicated.
    3. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening. Use where indicated.

C. Clothes Dryer Recessed Vent Box:
    4. Avendra, LLC Preferred Manufacturers:
        a. None
    5. Approved Manufacturers:
        a. "The Dryerbox Model DB-425 for 2" x 6" stud walls and DB-350 for 2" x 4" stud wallls; In-O-Vate Technologies, Inc. (888-443-7937)
    6. Recessed 22 gage molded steel dryer box for use in providing a receptacle in the wall to house dryer flex transition hose. Dryer Box shall be approved as a UL Through Penetration Firestop receptacle where required for use in fire-rated assemblies.

2.05 JOINT TREATMENT MATERIALS

A. General: Provide materials complying with ASTM C475, ASTM C840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.

B. Joint Tape: ASTM C475, 2-inch nominal width, paper reinforcing tape, unless otherwise indicated.

C. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
    1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
        a. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.

b. Apply water resistant tile adhesive to all cut or exposed edges, utility holes, and joints including those at wall intersections when installing moisture-resistant gypsum board panels.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.

4. Finish Coat: For third coat, use setting-type, sandable topping compound.

5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Spray-Applied Skim Coat Primer-Surfacer:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

"Sheetrock Brand Primer-Surfacer"; United States Gypsum Co. (800-950-3839)

a. No substitutions

3. Provide spray-applied dual-purpose acrylic latex-based coating, in lieu of skim coat of joint compound for Level 5 gypsum board finish at the following locations:

a. Pubic lobby area

b. Glass-Mat, Mold & Mildew Resistant Interior Wall Ceiling Panels where glass mat facing is exposed.

c. Other locations as shown on the Drawings

4. Contractor's option to use this product at other areas requiring Level 5 gypsum board finish.

2.06 ACOUSTICAL SEALANT

A. Avendra, LLC Preferred Manufacturers:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. None

B. Approved Manufacturers:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. Avendra, LLC Preferred Manufacturers:

1) None

b. Approved Manufacturers:

1) "AC-20 FTR Acoustical and Insulation Sealant"; Pecora Corp. (800-523-6688)

2) "SHEETROCK Acoustical Sealant"; United States Gypsum Co. (800-950-3839)

C. Latex Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E90.

2. Product has flame-spread and smoke-developed ratings of less than 25 per ASTM E84.

2.07 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum drywall construction which comply with referenced installation standards and the recommendations of the manufacturer of the gypsum board.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum boards to continuous substrates.

C. Spot Grout: ASTM C475, setting-type joint compound of type recommended for spot grouting hollow metal door frames.

D. Fastening Adhesive for Wood: ASTM C557.

E. Fastening Adhesive for Metal: Special adhesive recommended for attaching gypsum panels to steel framing.

F. Steel drill screws complying with ASTM C1002 for the following applications:

1. Fastening gypsum board to steel members less than 0.03 inch thick.

2. Fastening gypsum board to wood members.

3. Fastening gypsum board to gypsum board.

G. Steel drill screws complying with ASTM C954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

H. Gypsum Board Nails: ASTM C514.

I. Water: All water used in joint system shall be clean and free from deleterious amounts of foreign material.

J. Other Materials: All other materials not specifically described but required for a complete and proper installation of gypsum drywall shall be as selected by the Contractor, subject to approval by the Owner's representative.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates with Installer present, to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 CEILING ANCHORAGES:

A. Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.03 INSTALLATION - STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.

B. Install supplementary fire-treated wood framing, blocking, and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction to comply with details indicated and with recommendations of gypsum board manufacturer, or if none available, with "Gypsum Construction Handbook" published by United States Gypsum Co.

C. Do not bridge building expansion and control joints with steel framing or furring members. Independently frame both sides of joints with framing of furring members or a indicated.

D. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

E. Install steel studs so that flanges point in the same direction and gypsum boards can be installed in the direction opposite to that of the flange.

F. Frame door openings to comply with details indicated, with GA-600 and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws, wither directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

G. Curved Partitions:

1. Install flexible track system in accordance with track manufacturer's recommendations.

2. Begin and end each arc with a stud, and space intermediate studs equally along arcs at stud spacing recommended in writing by gypsum board manufacturer for radii indicated. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches o.c.

3. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or distortion.

H. Install thermal insulation as follows:

1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches on center.

2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or power-driven fasteners spaced 24 inches on center.

3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner. On adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation panel and continue in regular manner. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

4. Until gypsum board is installed, hold insulation in place with 10 inch staples fabricated from 0.0625 inch (16 gauge) diameter tie wire and inserted through slot in web of member.

3.04 INSTALLATION - STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Screw furring members to metal framing.

B. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate,

and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure, as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

5. Do not attach hangers to steel deck tabs.

6. Do not attach hangers to steel roof deck. Attach hangers to structural members.

7. Do not connect or suspend steel framing from ducts, pipes or conduit.

8. Sway-brace suspended steel framing with hangers used for support.

C. Install suspended steel framing components in sizes and at spacings indicated but not less than that required by the referenced steel framing installation standard.

1. Wire Hangers: 0.1620-inch (8-gauge) diameter, 4 feet o.c.

2. Carrying Channels (Main Runners): 1-1/2, 4 feet o.c.

3. Rigid Furring Channels (Furring Members): 16 inches o.c.

4. Rigid Furring Channels (Furring Members): 24 inches o.c.

D. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring members or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

E. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

F. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.05 APPLICATION AND FINISHING OF GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum board to comply with ASTM C840 and GA-216.

B. Install sound attenuation blankets where indicated, prior to gypsum board unless readily installed after board has been installed on one side.

C. Locate exposed end-butt joints as far from center of walls and ceilings as possible and stagger not less than 24 inches in alternate courses of board.

D. Install ceiling boards across framing in the manner which minimizes the number of end-butt joints and which avoids end joints in the central area of each ceiling. Stagger end joints at least 24 inches, but not less than one framing member.

E. Install wall/partition boards in manner which minimizes the number of end-butt joints or avoids them entirely where possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs. Gypsum boards shall extend tight to floors and ceilings with no gaps.

F. Install exposed gypsum board with face side out. Do not install imperfect, damaged, or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.

G. Locate either edge or end joints over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

H. Attach gypsum board to steel studs so that leading edge or end of each board is attached to open (unsupported) edge of stud flanged first.

I. Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

J. Form control joints and expansion joints at locations indicated, with space between edges of boards, prepared to receive trim accessories. If not shown on Drawings, control joints shall be installed as follows, in locations as approved by Architect:

1. A control joint shall be installed where a partition, wall, or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.

2. Control joints shall be installed where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet.

3. Control joints in interior ceilings with perimeter relief shall be installed so that linear dimensions between control joints do not exceed 50 feet and total area between control joints does not exceed 2500 sq. ft.

4. Control joints in interior ceilings without perimeter relief shall be installed so that linear dimensions between control joints do not exceed 30 feet and total area between control joints does not exceed 900 sq. ft.

5. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.

K. Where a control joint occurs in an acoustical or fire rated system, blocking shall be provided behind the control joint by using a backing material consisting of 5/8" type X gypsum board.

L. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4 inch to 1/2 inch space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant.

M. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions. Comply with ASTM C-919 and manufacturer's recommendations for location of edge trim and close off sound-flanking paths around or through construction, including sealing of partitions above acoustical ceilings.

N. Space fasteners in gypsum boards in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

3.06 INSTALLATION - GYPSUM BOARD

A. Single-Layer Application: Install gypsum wallboard as follows:

1. On ceilings, apply gypsum board prior to wall/partition board application to the greatest extent possible, and at right angles to framing, unless noted otherwise.

2. On partitions/walls, apply gypsum board vertically (parallel to framing), unless otherwise indicated, and provide sheet lengths which will minimize end joints.

B. Multi-layer Application: Install gypsum backing board for base layer and gypsum wallboard for face layer.

1. On ceilings, apply base layer prior to applying base layer on walls/partitions; apply face layers in same sequence. Offset face-layer joints one framing member, but not less than

16 inches from parallel base-layer joints. Apply base layers at right angles to framing members unless otherwise indicated.

2. On partitions/wall, apply base layer and face layers vertically (parallel to framing) with joints of base layer over supports and face layer joints offset at least, one stud or furring member, not less than 10 inches with base layer joints.

3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

C. Single-Layer Fastening Methods: Apply gypsum boards to supports with steel drill screws.

D. Multi-Layer Fastening Methods: Apply base layer of gypsum board and face layer to base layer as follows:

1. Fasten both base layers and face layers separately to supports with screws.

E. Direct-Bonding (Laminating) to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

F. Install gypsum wallboard panels with tapered edges taped and finished to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.

G. Wall Tile Substrates: For substrates indicated to receive thin-set ceramic tile and similar rigid applied wall finishes, comply with the following:

1. Install water-resistant Tile-Backer Board panels at all areas to receive tile.

2. Tile Backing Panels:

a. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer’s written installation instructions. Install where scheduled by Note #9 of the “Partition Schedule Notes” located on the drawings. Install with ¼ inch gap where panels abut other construction or penetrations.

b. Where tile backing panels abut other types of panels in the same plane, shim surface to produce a uniform plane across panel surfaces.

c. Areas Not Subject to Wetting: Install standard gypsum wallboard panels to product a flat surface except at showers, tubs, and other locations to receive water-resistant panels.

H. Curved Partitions:

1. Install panels horizontally and unbroken, to the extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.

2. Wet gypsum panels on surfaces that will become compressed where curve radius prevents using dry panels. Comply with gypsum board manufacturer's written recommendations for curve radii, wetting methods, stacking panels after wetting, and other preparations that precede installing wetted gypsum panels.

3. On convex sides of partitions, begin installation at one end of curved surface and fasten gypsum panels to studs as they are wrapped around curve. On concave side, start fastening panels to stud at center of curve and work outward to panel ends. Fasten panels to framing with screws spaced 12 inches o.c.

4. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

5. Allow wetted gypsum panels to dry before applying joint treatment.

3.07 INSTALLATION - TRIM ACCESSORIES

A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.

B. Install corner beads at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed or semi-exposed. Provide edge trim type with face flange formed to receive joint compound except where other types are indicated.

D. Install edge trim where edge of gypsum board would otherwise be exposed or semi-exposed. Provide edge trim-type with face flange to receive joint compound except where other types are indicated.

1. Install "LC" bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.

2. Install "L" bead where edge trim can only be installed after gypsum board is installed.

3. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

3.08 FINISHING OF GYPSUM BOARD ASSEMBLIES

A. General: Apply joint treatment at gypsum board joints (both directions), flanges of corner bead, edge trim, and control joints, penetrations, fastener heads, surface defects and elsewhere as required to prepare work for decoration and level of gypsum board finish indicated.

1. Prefill open joints, rounded or beveled edges, and damaged areas, using setting-type joint compound.

2. Apply joint tape over gypsum board joints except those with trim accessories having concealed face flanges not requiring taping to prevent cracks from developing in joint treatment at flange edges.

B. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.

2. Level 2 where water-resistant gypsum backing board panels form substrates for tile, and where indicated.

3. Level 4 for gypsum board surfaces indicated to receive light-textured finishes, wallcoverings, and flat paints over light textures.

4. Level 4 for gypsum board surfaces indicated to receive gloss and semi-gloss enamels, nontextured flat paints, and where indicated.

5. Level 5 for gypsum board exposed ceilings to receive paint, or wall surfaces indicated to receive graphic wall covering murals.

C. For Level 4 gypsum board finish, embed tape in finishing compound plus two separate coats applied over joints, angles, fastener heads, and trim accessories using one of the following combinations of joint compounds (not including prefill), and sand between coats and after last coat.

D. Where Level 5 gypsum board finish is indicated, apply joint compound combination specified for Level 4 plus a thin, uniform skim coat of joint compound over entire surface. Use joint compound specified for the finish (third coat) or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Produce surfaces free of tool marks and ridges ready for decoration of type indicated.

E. Where Level 2 gypsum board finish is indicated, apply joint specified for first coat in addition to embedding coat.

F. Where Level 1 gypsum board finish is indicated, apply joint compound specified for embedding coat.

G. Allow not less than 24 hours drying time between coats.

H. Glass-Mat Gypsum Interior Wall Panel:

1. Finish according to manufacturer's written instructions for use in interior applications.

3.09 SPRAY APPLIED SKIM COAT PRIMER SURFACER APPLICATION

A. Preparation:

1. General: Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

a. After completing coating operations in each area, reinstall items removed using workers skilled in trades involved.

2. Cleaning: Before applying coatings or other surface treatments, clean substrates of substances that could impair bond of coating systems. Remove oil and grease before cleaning.

a. Schedule cleaning and coating application so dust and other contaminants from cleaning operations will not fall on wet, newly coated surfaces.

3. Surface Preparation: Clean and prepare surfaces to be coated according to the manufacturer's written instructions for the particular substrate conditions, and as specified.

a. Gypsum Board Preparation:

1) Treat joints and fastener heads in accordance with U.S. Gypsum instructions for a minimum Level 4 wallboard finish.

2) Fill and smooth scratches and scuffs in gypsum board surfaces.

3) Allow gypsum board joint treatment and fillers to thoroughly dry before application.

b. Install sealant in joints. Refer to Section 07 92 00.

c. Material Preparation: Carefully mix and prepare materials according to the manufacturer's written instructions.

B. Application:

1. General: Apply finish to exposed surfaces indicated.

a. Primer-Surfacer Application: Mix and apply finish to gypsum panels indicated to receive finish according to finish manufacturer's directions. Using power spray equipment acceptable to finish manufacturer, produce a uniform thickness, free of starved spots, pin-holes, or other evidence of thin application or of application patterns, and free of excessive globules.

b. Prevent spray-applied finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If despite these precautions, finishes contact these surfaces, immediately remove droppings and overspray as recommended by finish manufacturer to prevent damage.

c. Color to be White.

C. Minimum Coating Thickness: Apply each material at not less than the manufacturer's recommended spreading rate. Provide total cured material thickness indicated or as recommended by the manufacturer.

3.10 ADJUST AND CLEAN

A. Cut, patch, repair, and point-up gypsum board as required. Repair cracks and indented surfaces.

B. Promptly remove compound from door frames, windows, and other surfaces. Repair floors, walls, and other surfaces which have been stained, marred, or otherwise damaged during the framing and gypsum board work. Daily remove unused materials, containers, and equipment. Clean floors of all gypsum board and wood debris and leave broom clean.

C. Clean spilled or splattered materials from adjacent surfaces not to be coated, immediately before coating has achieved an initial set. Do not scratch or damage adjacent finished surfaces.

3.11 PROTECTION

A. Provide final protection and maintain conditions, in a manner suitable to installer, which ensures gypsum drywall construction being without damage or deterioration at time of Substantial Completion.

END OF SECTION

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SECTION 09 21 16.23 - GYPSUM BOARD SHAFT-WALL ASSEMBLIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Shaft Enclosures
2. Chase Enclosures

B. Related Sections:

1. Section 07 84 00 - Firestopping
2. Section 07 92 00 – Joint Sealants
3. Section 09 21 16 - Gypsum Board Assemblies
4. Section 09 90 00 - Painting

1.02 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C11 for definitions of terms for gypsum board construction not defined in this Section or in other referenced standards.

1.03 REFERENCES

A. ASTM International (ASTM) Publications:

1. A653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process"
2. C11 “Standard Terminology Relating to Gypsum and Related Building Materials and Systems”
3. C36 “Standard Specification for Gypsum Wallboard (Withdrawn 2005)”
4. C442 “Standard Specification Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board”
5. C475 “Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board”
6. C645 “Standard Specification for Nonstructural Steel Framing Members“
7. C754 “Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products”
8. C834 “Standard Specification for Latex Sealants”
9. C840 “Standard Specification for Application and Finishing of Gypsum Board”
10. C919 “Standard Practice for Use of Sealants in Acoustical Applications
11. C954 “Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.112 in. in Thickness”
12. C1002 “Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs”
13. C1047 “Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base”
14. C1278 “Standard Specification for Fiber-Reinforced Gypsum Panel"

15. C1325 “Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Interior Substrate Sheets”
16. C1396 “Standard Specification for Gypsum Board”
17. D3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber"
18. E72 “Standard Test Methods of Conducting Strength Tests of Panels for Building Construction”
19. E84 “Standard Test Method for Surface Burning Characteristics of Building Materials”
20. E90 “Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements”
21. E119 "Standard Test Methods for Fire Tests of Building Construction and Materials"
22. E413 “Classification for Rating Sound Insulation”

B. FM Global (FM) Standards:

1. "Approval Guide, Building Products"

C. Underwriters Laboratory (UL):

1. "Fire Resistance Directory"
2. UL 723 “Test for Surface Burning Characteristics of Building Materials”

D. United States Gypsum Co. (USG):

1. "Gypsum Construction Handbook"

1.04 PERFORMANCE REQUIREMENTS

A. Structural Performance:

1. Provide gypsum board shaft-wall assemblies capable of withstanding the full air-pressure loads indicated for maximum heights of partitions without failing and while maintaining an airtight and smoke-tight seal. Evidence of failure includes deflections exceeding limits indicated, bending stresses causing studs to break or to distort, and end-reaction shear causing track (runners) to bend or to shear and studs to become crippled.

1.05 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: For each gypsum board shaft-wall assembly indicated.
2. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating.
    a. Include data substantiating that elevator entrances and other items that penetrate each gypsum board shaft-wall assembly do not negate fire-resistance rating.

B. LEED Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Certificates for Credit MR 5.1: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
    a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
    b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
3. Product Data for Credit EQ 4.1: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.

1.06 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from FMG's "Approval Guide, Building Products" and UL's "Fire Resistance Directory."

B. STC-Rated Assemblies: For gypsum board shaft-wall assemblies indicated to have STC ratings, provide assembly materials and construction complying with requirements of assemblies whose STC ratings were determined according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat on leveled supports off the ground to prevent sagging.

1.08 PROJECT CONDITIONS

A. Comply with requirements for environmental conditions, room temperatures, and ventilation specified in Section 09 21 16 - Gypsum Board Assemblies.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. G-P Gypsum Corporation (800-225-6119)
2. National Gypsum Company, Gold Bond Building Products Div. (800-628-4662)
3. United States Gypsum Co. (800-950-3839)
4. CertainTeed Corporation, a subsidiary of Saint-Gobain (800-233-8990)

2.02 ASSEMBLY MATERIALS

A. General: Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.

1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

B. Steel Framing: ASTM C645.
1. Protective Coating: ASTM A653, G40, hot-dip galvanized coating

C. Gypsum Shaft-Liner Panels:
1. Acceptable Manufacturer:
a. “Dens-Glass Ultra Shaftliner”; G-P Gypsum Corporation
b. “Sheetrock Gypsum Liner Panels – Mold Tough”; United States Gypsum Co
2. Type “X” or “SLX”, 1” thick water resistant gypsum core surfaced with coated glass mat facings that resist growth of mold and mildew and does not support fungus growth per ASTM D3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber".

D. Gypsum Wallboard: ASTM C36 or ASTM C1396, core type as required by fire-resistance-rated assembly indicated.
1. Refer to Section 09 21 16 - Gypsum Board Assemblies

E. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Section 09 21 16 - Gypsum Board Assemblies, that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.

F. Gypsum Wallboard Joint-Treatment Materials: ASTM C475 and as specified in Section 09 21 16 - Gypsum Board Assemblies.

G. Steel Drill Screws: ASTM C1002, unless otherwise indicated.
1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

H. Track (Runner) Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

I. Acoustical Sealant: As specified in Section 09 21 16 - Gypsum Board Assemblies.

2.03 GYPSUM BOARD SHAFT WALL

A. Basis-of-Design Product: As indicated on Drawings by design designation of a qualified testing and inspecting agency.

B. Deflection Limit: L/360

C. Studs: Manufacturer's standard profile for repetitive members and corner and end members and for fire-resistance-rated assembly indicated.
1. Depth: As indicated.
2. Minimum Base Metal Thickness: As indicated on Drawings.

D. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer.
1. Minimum Base Metal Thickness: As indicated on Drawings.

E. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.0341 inch thick.

F. STC Rating: As indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:

1. ASTM C754 for installing steel framing.

2. Section 09 21 16 - Gypsum Board Assemblies, for applying and finishing panels.

B. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with furring and other support.

C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.

1. At elevator hoistway door frames, provide jamb struts on each side of door frame.

2. Where handrails directly attach to gypsum board shaft-wall assemblies, provide galvanized steel reinforcing strip, accurately positioned and secured behind at least 1 face-layer panel. Size of reinforcing plate as shown on Drawings.

D. Integrate stair hanger rods with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.

E. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

F. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.

G. Install control joints to maintain fire-resistance rating of assemblies.

H. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C919, whichever is more stringent.

I. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 2 inches of the shaft face of structural beams, floor edges, and similar projections into shaft, install 5/8-inch-thick, gypsum board cants covering tops of projections.

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft-wall framing.

2. Where steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to the shaft-wall framing.

END OF SECTION

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SECTION 09 27 13 - GLASS-FIBER-REINFORCED GYPSUM FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Factory-Molded, Glass-Fiber-Reinforced Gypsum (GRG) Fabrications for Interior Applications.

a. Interior Column Covers

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry.
2. Section 07 92 00 – Joint Sealants
3. Section 09 21 16 - Gypsum Board Assemblies.
4. Section 09 51 23 - Acoustical Tile Ceilings
5. Section 09 72 00– Wall Coverings
6. Section 09 90 00 - Painting.

1.02 REFERENCES

A. ASTM International (ASTM) Publications: (Former American Society for Testing and Materials)

1. A653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process”
2. C11 “Standard Terminology Relating to Gypsum and Related Building Materials and Systems”
3. C473 "Standard Test Methods for Physical Testing of Gypsum Panel Products"
4. C475 “Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board”
5. C840 “Standard Specification for Application and Finishing of Gypsum Board”
6. C947 "Standard Test Method for Flexural Properties of Thin-Section Glass-Fiber-Reinforced Concrete (Using Simple Beam With Third-Point Loading)"
7. C954 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness”
8. C1002 “Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs”
9. C1047 “Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base”
10. C1355 "Standard Specification for Glass Fiber Reinforced Gypsum Composites"
11. C1381 “Standard Specification for Molded Glass Fiber Reinforced Gypsum Parts”
12. C1467 “Standard Specification for the Installation of Molded Glass Fiber Reinforced Gypsum Parts”
13. E84 "Standard Test Method for Surface Burning Characteristics of Building Materials"

1.03 SYSTEM DESCRIPTION

A. The installing contractor shall perform all work in this section, including installation, taping and patching and will assume responsibility for coordinating installation with gypsum wallboard work and associated trades.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 and the following supporting data:

1. Product Data: Submit manufacturer’s detailed technical data for material and fabrication, including catalog cuts of anchors, hardware, fastenings, and related accessories.

2. Shop Drawings: Submit shop drawings for fabrication and erection of GRG components, and installation for anchorage devices. Indicate material, construction, dimensions, locations, tolerances, installation, and connection details.

1.05 QUALITY ASSURANCE

A. Mockups: Build mockups to set quality standard for fabrication and installation.

1. Build mockups of each type of GRG fabrication.

2. Paint mockups to match final decoration scheduled or indicated and to comply with requirements specified in other Division 09 Sections.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Fire-Test-Response Characteristics: Provide glass-reinforced gypsum (GRG) fabrications with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or another independent testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame Spread: 25 or less.

2. Smoke Developed: 450 or less.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Units shall be handled and transported per manufacturer’s recommendation, in a manner so as not to create damage or excessive stresses.

B. GRG units shall be stored level on a clean dry surface in an area protected from weather, moisture and damage. Keep material in manufacturer's original crate until ready to install. The units shall not be stacked or leaned unless instructed otherwise by the manufacturer.

1. Do not deliver or install GRG fabrications until building is enclosed, wet work is complete, and HVAC system is operating and continuously maintaining temperature and relative humidity at levels intended for building occupants.

1.07 PROJECT CONDITIONS

A. Environmental Conditions:

1. Comply with requirements in ASTM C1467.

B. Conditioning: Acclimatize GRG fabrications to ambient temperature and humidity of spaces in which they will be installed. Remove packaging and move units into installation spaces not less than 48 hours before installing them.

C. Field Measurements: Where GRG fabrications are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.08 COORDINATION

A. Coordinate layout and installation of GRG fabrications with support components specified in other Sections.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Avendra, LLC Preferred Manufactures:

1. None

B. Approved Manufacturers:

1. DecoForm, Inc. (416-745-4970)
2. Formglas Inc. (416-635-8030)
3. Plastrglas, Inc. (402-455-0652)

2.02 GLASS-FIBER-REINFORCED GYPSUM (GRG) FABRICATIONS

A. Fabrications: Molded, glass-fiber-reinforced reinforced (GRG) gypsum units complying with ASTM C1381.

1. GRG Fabricated Units: Custom Interior Column Covers;

a. Size: 18 to 20-inch Diameter, smooth, plain, non-tapered profile. Coordinate final size with rated column enclosure.

B. Embedments: As standard with GRG fabrication manufacturer and as required for reinforcement and for anchorage to substrates and framing.

C. Materials

1. General: Provide materials selected for surface smoothness with out pitting, seam marks, stains, and other imperfections on finished units.
2. Glass-fiber reinforced gypsum (GRG) fabrication: ASTM C1355.
3. Gypsum: High density, free of asbestos and resins.
4. Water: Potable.
5. Glass-fiber: Continuous filament, random glass-fiber mat, or chopped strand fiber.
6. Anchors and Fasteners: Type 304 stainless steel where exposed; hop dip galvanized steel where unexposed.
7. Form stripping agent: Colorless mineral oil, free of kerosene and must be compatible with and for application of sealant and applied finishes.
8. Units shall be suitably reinforced with additional materials as required.

D. Design Criteria

1. Fabrication tolerances are as indicated below.

a. Dimensional - all directions (0’-10’): ± 1/8” (3.2mm)

b. Dimensional - all directions (10’-20’): ± 3/16” (4.8mm)

c. Straightness along an edge or surface: ± 1/8”/linear ft.

d. All reveals, setbacks or returns: 5º draft

e. All corners: 1/16” - 1/8” radius

f. Surface: GRG Components shall be free of scratches and blemishes.

E. Physical Properties

1.	Glass content:	5-6% by weight.
2.	Density:	103-112 lb./cu. ft.
3.	Shell Thickness:	1/8” min.
4.	Flame Spread Index (ASTM E84):	0
5.	Fuel Contribution (ASTM E84):	0
6.	Smoke Developed Index (ASTM E84):	0 (5, water vapor)
7.	Compressive Strength (ASTM C472):	11,289 psi (77.83 MPa) (average)
8.	Flexural Strength (M.O.R.) (ASTM C947):	3,084 psi (21.27 MPa) (mean value)
9.	Flexural Strength (P.E.L.) (ASTM C947):	2,857 psi (19.70 MPa) (mean value)
10.	Ultimate Tensile Strength (ASTM D638):	1,220 psi (8.41 MPa) (mean value)
11.	Compressive Strength (ASTM D638):	5,790 psi (39.9 MPa) (mean value)
12.	Impact Resistance (ASTM D256):	7.88 ft.lb./in. (mean value)
13.	Barcol Hardness (ASTM D2583):	64 (mean value)
14.	Consistency:	25-30 c.c.
15.	Specific Heat:	0.253 Btu/lb./ºF
16.	Dielectric Strength:	Same as air w/dry, conductive w/wet
17.	Coefficient of Thermal Expansion (ASTM D696):	1.31 x 10-6 mm/mm/ºC (7.3 x 10-6 in/in/ºF) (average)
18.	Nail Pull (wood embedment) (ASTM C473):	480 lbf. (min.)
19.	Nail Pull (metal embedment) (ASTM A370):	590 lbf. (min.)
20.	Behaviour at 750ºC (ASTM E136):	18.78% mass loss (mean average)
21.	Humidified Deflection (ASTM C473):	3 mm. mid-point deflection. (mean value)

2.03 AUXILIARY MATERIALS

A. Adhesives: As recommended by manufacturer.

1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Steel Drill Screws: Of sufficient length and size to securely fasten GRG fabrications to framing members, and as follows:

1. Screws complying with ASTM C1002 for fastening GRG fabrications to steel members less than 0.033 inch thick.

2. Screws complying with ASTM C954 for fastening GRG fabrications to steel members from 0.033 to 0.112 inch thick.

C. Joint-Treatment Materials: ASTM C475.

2.04 FABRICATION

A. Fabricate GRG units to comply with ASTM C1381, with smooth-finished surfaces; repair hollows, voids, scratches, and other surface imperfections. Fabricate units in lengths and sizes that will minimize number of joints between abutting units.

B. Embedments: Incorporate embedments into units to develop the full strength of GRG fabrications. Cover embedments with not less than 3/16-inch thickness of GRG composite.

C. Connection Hardware: Furnish units with custom shapes, brackets, and attachment hardware as designed and fabricated to support and connect GRG fabrications to hangers, support framing, and substrates.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with requirements in ASTM C1467.

B. Install GRG fabrications level, plumb, true, and aligned with adjacent materials. Use concealed shims where required for alignment.

C. Attach GRG fabrications to framing and substrates with steel drill screws, unless otherwise indicated. Do not use pneumatic staple guns. Countersink screw heads below adjoining finished surface.

1. Provide all support framing, reinforcing, and support brackets required for work of this Section and to ensure solid and secure installation.

2. Predrill fastener holes in units. Clean fastener holes to remove dirt and oil.

3. Locate fasteners not less than 5/16 inch from edges or ends of units.

D. Where GRG fabrications are joined to form composite units, join fabrications with adhesive. Band or brace units together until adhesive cures.

E. Install control joints between GRG fabrications where indicated.

F. Use joint-treatment materials to finish GRG fabrications to produce surfaces ready to receive primers and paint finishes specified in other Division 09 Sections.

1. Finish joints between units, other than control joints, and countersunk fastener heads to comply with ASTM C840 for Level 5 and to match surface texture of units. Exercise care in taping and finishing to prevent “crowning”.

2. Repair hollows, voids, scratches, and other surface imperfections on units.

G. Finishing

1. Refer to Section 09 90 00 “Painting”.

2. The painting contractor shall comply with ASTM C840 specifications, specifically with regard to sealing.

3.03 ADJUSTING AND CLEANING

A. Repair any defects found after the work of all trades has been completed, regardless of how, or whom, the damage was caused. Patching shall match the original work.

B. Patch all countersunk fasteners and damages to match unit’s texture, finished flush with face of unit.

END OF SECTION

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SECTION 09 30 00 - TILING

PART 1 PRODUCTS

1.01 SUMMARY

A. Section Includes:

1. Floor and Wall Tile and Accessories
2. Crack Bridging Membrane
3. Leveling Coat, Mortar, Grouts, and Adhesives
4. Shower Pan Liners
5. Waterproofing Membrane
6. Thresholds

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 05 50 00 – Metal Fabrications
3. Section 07 92 00 - Joint Sealants
4. Section 09 21 16 - Gypsum Board Assemblies
5. Section 13 11 00.02 - Swimming Pools - Interior

1.02 REFERENCES

A. Tile Council of North America, Inc. - "Hand Book for Ceramic Tile Installation".

B. ANSI A108.5 - Ceramic Tile Installed with Dry-Set Portland Cement Mortar.

C. ANSI A118.1 - Dry-Set Portland Cement Mortar

D. ANSI A118.3 – “Chemical Resistant, water cleanable tile-setting and –grouting epoxy”

E. ANSI A118.4 – “Latex-Portand Cement mortar”

F. ANSI A118.7 – “Polymer modified cement grouts”

G. ANSI A137.1 - Recommended Standard Specifications for Ceramic Tile

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00.

B. LEED Submittal:

1. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

1.04 QUALITY ASSURANCE

A. In addition to complying with all pertinent codes and regulations, conform to ANSI - American Standard Specification for the Installation of Ceramic Tile.

B. A single manufacturer shall produce all tiles and accessories.

C. Performance Requirements:

1. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C1028:

a. All horizontal Surfaces: Minimum 0.6 Wet

b. Step Treads: Minimum 0.6. Wet

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Deliver packaged materials and store in original containers with seals unbroken and labels intact until time of use in accordance with manufacturer's directions. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

B. Comply with ANSI A137.1 for labeling sealed tile packages.

C. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.06 PROJECT CONDITIONS

A. Substrate shall be prepared to receive new tile in a manner acceptable to the tile manufacturer. Existing flooring and other materials shall be removed and surface prepared to accept new tile.

B. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

1.07 EXTRA MATERIALS

A. Refer to Section 01 78 43

PART 2 PRODUCTS

2.01 FLOOR AND WALL TIL

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Dal-Tile Corporation (630-789-1479)
2. GranitiFiandre (727-522-6655)
3. Crossville Ceramics Co. (931-484-2110)
4. Ceramic Technics Ltd. (770-740-0050)
5. Latco Products (800-422-6860)
6. Florida Tile Industries, Inc. (301-929-8453)

C. Floor Tile: Refer to Interior Finish Index

D. Wall Tile: Refer to Interior Finish Index

E. Tile Base and Accessories: Provide special shapes such as bull-nose edges and other accessories as required, to match wall tile.

1. Provide matching bull-nose tile at all exposed edges.

2.02 CRACK BRIDGING MEMBRANE

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Laticrete 150 Crack Isolation Mat"; Laticrete International Inc. (800-243-4788)

2. "Dal-Seal TS", Dal-Tile (800-933-Tile).
3. "Strataflex Anti-Fracture Membrane" National Applied Construction Products, Inc., (800-633-4622).
4. "Nobleseal CIS Crack Isolation Sheet", The Noble Co., (800-878-5788).
5. "TEC Hydraflex Crack Isolation and Waterproofing Membrane", TEC Specialty Construction Brands (800-832-9023

C. Provide self-bonding elastomeric membrane capable of heavy-duty service per ASTM C-627. Liquid-applied products will not be allowed.

D. Primer: As required by the slip sheet manufacturer.

E. Furnish in 12 inch and 36 inch wide sheets in lengths required.

2.03 LEVELING COAT

A. Leveling coat shall be 1/4" thick or less and shall consist of dry set mortar to which an equal volume of a mixture of one part Portland Cement and 1-1/2 parts sand has been added.

B. Maximum variation in surface of leveling coat shall not exceed 1/8" in 8'-0" from required plane.

C. Leveling coat shall be cured at least 24 hours before tile is applied.

D. Surface to which leveling coat is to be applied shall be free of any coatings, oil, and wax.

2.04 MORTAR MATERIALS: FLOOR TILE

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Pro Spec PermaFlex 400"; Bonsal America, Inc., A division of Oldcastle APG (800-738-1621)
2. "Hydroment Flex-A-Lastic/Tile-Mate"; Hydroment (Bostick Findley,Inc.) (800-523-2678)
3. "Laticrete 254 Platinum Multipurpose Thinset Mortar"; Laticrete International Inc. (800-243-4788)
4. "FlexBond Premium Flexible Bonding Mortar"; Custom Building Products (800-272-8786)
5. "TEC 3N1 Performance Mortar", TEC Specialty Construction Brands (800-832-9023)

C. Bond Coat: Thin Set Mortar with Polymer or Acrylic/Latex Additive

D. Installation conforming to ANSI A108.5 and A118.4 and Tile Council of North America Handbook for Ceramic Tile Installation No. 22F131 and TR911.

2.05 MORTAR MATERIALS: POOL DECK

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Pro Spec B-7000 Epoxy Mortar and Grout"; Bonsal America, Inc., A division of Oldcastle APG (800-738-1621)
2. "Hydroment EzPoxy Mortar and Grout"; Hydroment Bostick Findley, Inc (800-523-2678)
3. "LATAPOXY 300 Adhesive"; Laticrete International Inc. (800-243-4788)

4. "EBM-lite Epoxy Bonding Mortar & Grout"; Custom Building Products (800-272-8786)
5. “AccuColor EFX® Epoxy Special Effects Grout ”, TEC Specialty Construction Brands (800-832-9023)

C. Installation conforming to ANSI A108.3 Tile Council of North America Handbook for Ceramic

2.06 WALL ADHESIVE MATERIALS - CERAMIC TILE

A. High strength latex-based, non-flammable adhesive formulated to meet or exceed the requirements of ANSI A136.1, Type 1.

B. Gypsum Wallboard:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers:
   a. "7001 Mastic”; Hydroment (Bostick Findley, Inc.) (800-523-2678)
   b. "Laticrete 15 Premium Multi-Mastic Adhesive”; Laticrete International Inc. (800-243-4788)
   c. “Pro Spec B-4050 Multi-Purpose Adhesive”; Bonsal America, Inc., A division of Oldcastle APG (800-738-1621) “
   d. "CustomBond Ceramic Tile Mastic"; Custom Building Products (800-272-8786)
   e. “TEC Double Duty Plus”, TEC Specialty Construction Brands (800-832-9023)

2.07 GROUT MATERIALS (Typical)

A. Latex Portland Cement Grout consisting of dry set mortar with a acrylic latex or polymer additive. Use in conformance with ANSI A108.5 and ANSI A105.10. Materials shall conform to ANSI A118.3 and A118.7.

1. Color as shown on Interior Finish Index.

B. Avendra, LLC Preferred Manufacturers:

1. None

C. Approved Manufacturers:

1. Laticrete International Inc. (800-243-4788)
   a. Epoxy Grout (All Joint Widths - Floor and Wall)
      1) All areas except Swimming Pool Decks and Prep-Kitchens: “SpectraLOCK Pro Epoxy Grout”
      2) Swimming Pool Decks and Prep-Kitchens: “SpectraLOCK 2000 IG”

2.08 GROUT MATERIALS (Pool)

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Mapei, Inc. (800-42M-APEI)
   a. Epoxy Grout (All Joint Widths - Pool Deck)
      1) “Ker 400 Series Kerapoxy Stain-Free Epoxy Grout”
2. Custom Building Products (800-272-8786)

a. Epoxy Grout (All Joint Widths – Pool Deck)

1) "100% Solids Epoxy Grout"

3. Hydroment (Bostick findley, Inc.) (800-523-2678)

a. Epoxy Grout (All Joint Widths – Pool Deck and Kitchen Floor Only)

1) "Hydroment Color-Poxy"

4. TEC Specialty Construction Brands (800-832-9023)

a. Epoxy Grout (Joints 1/16"-1/2" - Floor Only)

1) "TA470 Epoxy Grout and Mortar"

C. Epoxy Mortar and Grout: High temperature materials capable of service temperatures of 212 degrees F. without deterioration, conforming to requirements of ANSI A118.3, and certified by manufacturer as suitable for intended use.

2.09 PREFABRICATED SHOWER FLOOR PAN

A. Typical Shower Applications: Prefabricated Shower Pan and Curb system for showers indicated on the drawings, shall be one of the following products:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. "Tile Ready"; Tile-Redi USA LLC (800-232-6156)

b. Other Manufacturers: As approved prior to bid, when submitted in accordance with Div 1 SUBSTITUTION PROCEDURES.

B. Prefabricated shower pan and curb system with fully integrated drains shall be one-piece molded polyurethane receptor listed by UL as plastic plumbing fixtures, and in conformance with ASTM F462. Where installed in Accessible Roll-In Showers, conform to ANSI A117.1 and all local codes and use shower floor pan liner below..

1. Size: Size and configuration as shown on Drawings.

C. Provide all required accessories including epoxy setting materials. Provide "Redi Flash" flashing material to waterproof junctions between shower pan and field applied wall board. All as recommended by shower pan manufacturer.

2.10 SHOWER FLOOR PAN LINER AND WATERPROOFING MEMBRANE

A. ADA Compliant Roll-in Showers and elevated tile floors. Material for lining concrete subfloor where indicated on the drawings shall be one of the following products:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. "Chloraloy"; The Noble Co. (800-878-5788)

b. "Bituthene 3100"; W.R. Grace Masonry Products (800-558-7006)

c. "TEC Hydraflex Crack Isolation and Waterproofing Membrane", TEC Specialty Construction Brands (800-832-9023)

d. "Laticrete 9235 Thin Load Bearing Waterproofing and Crack Isolation Membrane"; Laticrete International Inc. (800-243-4788)

e. "DITRA"; Schluter Systems L.P. (800-472-4588)

B. Provide all required accessories including preformed inside and outside corners, cap strips, and pipe protrusion collars.

2.11 THRESHOLDS

A. Georgia Marble, complying with ASTM 503 requirements, Grade A, free from cracks, chips, stains, or other defects, uniform in tone and coloring. Minimum abrasive-hardness value of 10 per ASTM C241. Finish to be fine sand-honed on faces and beveled edges.

B. Color and size as shown in Interior Finish Index.

2.12 ACCESSORIES

A. Edging and Transition Strips for floor tile:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. Schluter Systems (800-574-8481)

b. Ceramic Tool Company, Inc. (800-236-5230)

c. Approved Substitution by Marriott International

3. Miter corners and angles. Install in longest lengths possible with closely fitted and aligned butt joints, and with horizontal leg keyed into the mortar bed. Top edge shall be set flush with finished floor tile. Clean and remove any mortar stains.

4. Refer to Interior Finish Index and Drawings for model, material and color.

2.13 OTHER MATERIALS:

A. Joint Sealant to include sealing of ceramic tile surfaces at internal and external corners, transitions in plane and where ceramic tile work abuts dissimilar materials.

1. Refer to Section 07920 (07 92 00) for sealant specifications.

B. Other materials, including adhesives not specifically described but required for a complete and proper installation of tiles, shall be only as recommended by the manufacturer of material to which it is applied.

2.14 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 EXECUTION

3.01 INSPECTION:

A. Installer must examine the areas and conditions under which flooring and accessories are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 PREPARATION:

A. Prior to laying flooring, vacuum and remove all contaminates from surfaces to be covered and inspect subfloor. Start of flooring installation indicates acceptance of subfloor conditions and full responsibility for completed work. Use leveling compound as recommended by flooring manufacturer for filling small cracks and depressions in subfloors.

1. Concrete Subfloors:

a. Slab substrates are dry and free of curing compounds, sealers, hardeners, residual adhesives, adhesive removers, and other materials whose presence would interfere with bonding of tile adhesive or mortar and comply with surface finish requirements of ANSI A108.01. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by manufacturer.

b. Subfloor Moisture Conditions: Before installing flooring Contractor shall verify that Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1 and does not exceed the capacity of the specified adhesive or mortar, with subfloor temperatures not less than 55 deg F, or as recommended by manufacturer.

c. New concrete surfaces shall be wood-floated or broom finished. Overtroweled slabs are not acceptable.

B. Apply concrete slab primer for ceramic tile, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.03 CRACK BRIDGING MEMBRANE

A. Install membrane in strict accordance with manufacturer's specifications.

B. Provide width of membrane as recommended by membrane manufacturer, but no less than three (3) times the width of the tile used at all control joints and existing cracks in concrete floor.

3.04 TILE INSTALLATION - GENERAL

A. Comply with the ANSI Standard Installation Specification A108.1 through A108.13 and TCNA's "Handbook for Ceramic Tile Installation".

B. Handle, store, mix, and apply mortar and grout in compliance with manufacturer's instructions.

C. Extend tile work into recesses and under equipment and fixtures to form a complete covering without interruptions. Terminate work neatly at obstructions, edges, and corners without disruption of pattern, joint alignment, or bridging of Expansion Joints or Control Joints.

D. Install tile after finishing operations, including painting, have been completed. Moisture content of concrete slabs, building air temperature, and relative humidity must be within limits recommended by the flooring manufacturer.

E. Expansion Joints: Provide expansion joints, control joints and pressure relieving joints of widths and locations according to TCNA Handbook Construction No. EJ171, and as approved by Owner's Representative and Architect. Do not saw cut joints after application.

F. Lay tile from center marks established from center of area so that tile at opposing edges of the area are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at edge perimeters. Lay tile square to room axis unless otherwise shown.

G. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged. Cut tile neatly in and around all fixtures. Broken, cracked, chipped, or deformed tile are not acceptable.

H. Lay tile with grain in tile running in same direction. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items.

I. Sound tile after setting and replace hollow sounding units.

J. Grout tile to comply with the requirements of the ANSI A18.10 tile installation standards:

3.05 SHOWER FLOOR PAN LINER INSTALLATION

A. Install materials as directed by manufacturer to provide a concealed waterproof membrane. All seams shall be adhered to prevent delamination as specified by manufacturer. Upon completion, test for leaks by plugging the drain and filling with water. Make necessary adjustments to stop all leakage and retest until watertight, before top layers are installed.

3.06 PREFABRICATED SHOWER FLOOR PAN INSTALLATION

A. Install materials as directed by manufacturer to provide a concealed waterproof system. Upon completion, test for leaks by plugging the drain and filling with water. Make necessary adjustments to stop all leakage and retest until watertight, before finish materials are installed.

3.07 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCNA installation methods and ANSI A108 series of tile installation standards.

B. Back Buttering: For installations indicated, obtain 100% mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:

1. Exterior tile floors.

2. Tile floors in wet areas, including showers, tub enclosures, laundries, and swimming pools.

3. Tile floors composed of tiles 8”x 8” or larger.

4. Tile floors composed of rib-backed tiles.

C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

D. Metal Edge Strips: Install at locations indicated or at all locations where exposed edge of tile flooring meets carpet, wood, or other flooring, unless otherwise indicated.

3.08 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Wall Installation Schedule, including those referencing TCNA installation methods and ANSI setting-bed standards.

B. Back Buttering: For installations indicated, obtain 100% mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:

1. Exterior tile wall installations.

2. Tile wall installations in wet areas, including showers, tub enclosures, laundries, and swimming pools.

3. Tile wall installations composed of tiles 8”x 8” or larger.

C. Regrouting:

1. Mix dry ingredients with admixture first and in accordance with manufacturer's recommendations.
    a. Do not add water, additional grout or other ingredients after slaking period.
    b. Color as shown on Interior Finish Index.
2. Do not grout joint between side of bathtub and tile. Seal with sanitary sealant.
3. Install grout in accordance with ANSI A108.10. Use rubber float, firmly pull grout diagonally across joints to force grout into and uniformly fill all joints.
4. Fill all gaps and skips. Finished grout shall be uniform in color, smooth and without voids, pin holes or low spots.
5. Remove excess grout from face of tile using sponges and clean water. Change water frequently.

D. Final Cleaning:

1. After grout has set, thoroughly rinse tile surfaces with sponges and clean water to remove any remaining grout film from face of tile.
2. Immediately following rinse, remove all water with wet/dry vacuum or clean sponge.
3. Clean tile to remove all grout haze and residue. Utilize specified cleaning products to leave floor thoroughly cleaned as approved by Owner's Representative.
4. At floors, apply coat of sealer to tile and grout joints.

3.09 EPOXY TILE INSTALLATION

A. Pool: Thickset; TCA method F132; Epoxy Mortar and Grout, ANSI A108.6.

B. Elevated Decking: Thinset; TCA method F131 modified; Epoxy Mortar and Grout over waterproofing membrane.
    a. Tile and Grout: ANSI A108.6.

3.10 ADJUST AND CLEAN

A. Clean grout and setting material from face of tile while materials are workable. Leave tile face clean and free of all foreign matter.

B. Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective work.

C. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed surface. Protect installed tile work with Kraft paper or other heavy covering during the construction period to prevent damage. Prohibit all foot and wheel traffic from using tiled floors for at least 3 days, preferably 7 days.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from all tile surfaces.

END OF SECTION

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SECTION 09 51 23 - ACOUSTICAL TILE CEILINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Suspended Metal Grid Systems Complete With Wall Trim
2. Ceiling Tiles

B. Related Sections:

1. Section 09 54 29 – Wood Panel Ceilings
2. Divisions 21, 23, and 26 Sections for light fixtures, sprinklers, and air-distribution components.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 and the following supporting data:

1. Submit manufacturer's product and maintenance data for each type of ceiling system and accessory.

B. LEED Submittals:

1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
   a. Include statement indicating costs for each product having recycled content.
2. Product Data for Credit EQ 4.1: For sealants, including printed statement of VOC content.

1.03 QUALITY ASSURANCE

A. Qualifications of Installers:

1. The suspended ceiling Subcontractor shall have a record of successful installations of similar ceilings acceptable to the Architect.
2. For the actual fabrication and installation of all components of the system, use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.

B. In addition to complying with all pertinent codes and regulations, suspension system shall be installed according to ASTM C636, Installation of Metal Ceiling Suspension System for Acoustical Tile and Lay-in Panels.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Use all means necessary to protect the materials of this Section before, during, and after installation and to protect work and materials of all other trades.

1.05 PROJECT CONDITIONS

A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust-generating activities have terminated, and overhead work is completed, tested, and approved.

1.06 REPLACEMENT STOCK

A. Refer to Section 01 78 43.

PART 2 PRODUCTS

2.01 STRUCTURAL EXPOSED SUSPENSION SYSTEM

A. Product: Refer to Interior Finish Index

1. Approved Manufacturers:

a. Armstrong World Industries, Inc. (888-234-5464)

b. Chicago Metallic Company (800-323-7164)

c. USG Interiors, Inc. (800-950-3839)

d. Approved substitution

2.02 ACOUSTICAL MATERIALS

A. Product: Refer to Interior Finish Index.

1. Approved Manufacturers:

a. Armstrong World Industries, Inc. (888-234-5464)

b. Chicago Metallic Company (800-323-7164)

c. USG Interiors, Inc. (800-950-3839)

d. Approved substitution

2.03 LIGHTING: Contractor shall be responsible for providing sufficient support on grid systems to support light fixtures. All fixtures shall be supported at each and every corner.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection: Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that suspended ceiling systems are installed in strict accordance with all pertinent codes and regulations, and the manufacturer's recommendations.

B. Discrepancies: In the event of discrepancy, immediately notify the Owner's Representative. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION

A. General:

1. Install acoustical panel, suspension system and accessories in compliance with manufacturers instructions and requirements of ASTM C636.

2. Install ceiling system in a true and even plane with straight line courses laid out symmetrically about center lines of area or as indicated. Border tile shall be minimum 6" wide and neatly fit against vertical surfaces to form a tight fit.

3. Provide metal edge angle at perimeter of units as detailed on Drawings. Cut and fit around light fixtures, diffusers, etc.

B. Lay-In Ceiling System:

1. Hanging main tees parallel in a flat plane by means of #10 gauge wire hangers attached to construction above. Hangers shall be spaced not over 4'-0" along the main tees and within 6" of the ends and splices of main tees, and other interruptions. Main tees shall be

spaced 2'- 0" o.c. Cross tees shall be interlocked to main tees and spaced as required to support tile edges.

2. Attachment to ducts, pipes, etc. will not be permitted. Bridge under obstructions with a grid of 1-1/2" cold rolled channels or other suitable members to support ceiling grid.

3. Install wall angle at perimeter of walls, partitions, columns, pipes, and other obstructions that extend above the ceiling. Securely attach with appropriate fastening devices at maximum 16" o.c. Form reveal of same depth and width as that formed between edge of panel and flange at exposed suspension grid. Neatly cut and fit around light fixtures, diffusers, etc. Provide wall angles fabricated to diameter required to fit penetrations.

4. Insert ceiling panels, installing hold down clips on panels extending over partitions and where required to maintain fire ratings.

5. At all locations where ceiling tiles are cut, the cut edges of the tiles shall match the premanufactured edges (i.e. cut edges are to be beveled to match beveled edged tiles). Exposed cut edges are to be painted to match face of tile with paint as approved by tile manufacturer.

3.03 ADJUSTING AND CLEANING

A. Completely remove all finger prints and traces of soil and damage from the surfaces of grid and acoustical materials, using only those cleaning materials recommended for that purpose by the manufacturer of the material being cleaned.

B. Replace units which are damaged or improperly installed.

END OF SECTION

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SECTION 09 54 29 - WOOD PANEL CEILINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Radial Wood Veneer Ceiling Panels.
2. Wood Veneer Ceiling Panels.
3. Ceiling Support Grid System.
4. Wire hangers, fasteners, main runners, cross tees, wall angle moldings and accessories.

B. Related Sections:

1. Section 09 21 16 – Gypsum Board Assemblies
2. Section 09 51 23 - Acoustical Tile Ceilings
3. Divisions 21, 23, and 26 Sections for light fixtures, sprinklers, and air-distribution components.

1.02 DEFINITIONS

A. LR: Light Reflectance coefficient.

B. NRC: Noise Reduction Coefficient.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
3. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.
9. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
10. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
11. ASTM E 1264 Classification for Acoustical Ceiling Products.

1.04 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 and the following supporting data:

1. Submit manufacturer's product and maintenance data for each type of ceiling system and accessory.

B. LEED Submittals:

1. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

a. Include statement indicating costs for each product having recycled content.

2. Product Data for Credit EQ 4.1: For sealants, including printed statement of VOC content.

C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:

1. Minimum 3-1/2 inch x 5-1/2 inch samples of specified acoustical panel.

2. Suspension System Members: 12-inch- long Sample of each type.

3. Exposed Molding and Trim: Set of 12-inch- long Samples of each type, finish, and color.

4. Filler Strips: Set of 12-inch- long Samples of each type, finish, and color.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Wood Panel layout.

2. Ceiling suspension members.

3. Method of attaching hangers to building structure.

4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.

5. Ceiling perimeter and penetrations through ceiling; trim and moldings.

6. Minimum Drawing Scale: 1/4 inch = 1 foot (1:48).

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each linear metal ceiling.

F. Maintenance Data: For finishes to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain each set of wood panels and suspension systems from one source with resources to provide products of consistent quality in appearance, physical properties, and performance.

B. Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization acceptable to authorities having jurisdiction

1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.

a. Flame Spread: 25 or less

b. Smoke Developed: 50 or less

2. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E-84 tunnel test.

C. Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.

D. Installation shall be in accordance with all pertinent codes and regulations.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood panel ceiling, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Handle wood panel ceiling, suspension system components, and accessories carefully to avoid damaging units and finishes in any way.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not install wood panel ceilings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Wood veneer ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

C. The wood veneer panels should not be installed in spaces where the temperature or humidity conditions vary greatly from the temperatures and conditions that will be normal in the occupied space.

D. As interior finish products, the wood veneer panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.08 COORDINATION

A. Coordinate layout and installation of wood panel ceiling and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.09 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wood Panel Ceiling Components: Quantity of each pan, carrier, accessory, and exposed molding and trim equal to 2 percent of quantity installed.

PART 2 PRODUCTS

2.01 RADIAL WOOD VENEER CEILING SYSTEM

A. Product: Refer to Interior Finish Index

1. Approved Manufacturers:

a. Armstrong World Industries, Inc. (888-234-5464)

b. Rulon Company (800-227-8566)

c. USG Interiors, Inc. (800-950-3839)

d. Approved substitution

B. Type A - Wood Ceiling Panels Radial System:

1. Surface Texture: Smooth

2. Composition: Wood

3. Substrate: Duraflake FR, Class A rated fire-retardant particleboard.

4. Finish: Manufacturer's standard natural veneer Surface Texture: Smooth

5. Species: Grade A, Natural Variations Light Cherry

6. Perforations:

a. Pattern # RD 6006 (Standard Veneers; Natural Variations Light Cherry)

b. Hole size: 6 mm

c. On center spacing: 32.0 mm

d. % Open area: 6.0

7. Size: Trapezoidal panels according to architectural drawings

8. Edge Detail: Square cut edge for installation on WoodWorks Hook-on suspension system.

9. Edge Banding and Trim: To match face veneer

10. Noise Reduction Coefficient (NRC): ASTM C 423; 0.40

11. Ceiling Attenuation Class (CAC): ASTM C 1414; 28

12. Flame Spread: Class A Composite per IBC

13. Joint Gaskets: Joints are gasketed with a 6mm gasket; black in color.

C. Accessories: Provide all accessories, trims and etc. needed for proper installation of system and as shown on drawings. See drawings and Interior Finish Index for additional required Axiom type trims.

2.02 WOOD VENEER CEILING SYSTEM

A. Product: Refer to Interior Finish Index

1. Approved Manufacturers:

a. Armstrong World Industries, Inc. (888-234-5464)

b. Rulon Company (800-227-8566)

c. USG Interiors, Inc. (800-950-3839)

d. Approved substitution

B. Type B - Wood Ceiling Panels Vector 2X2:

1. Surface Texture: Smooth
2. Composition: Wood
3. Finish: Manufacturer's standard natural veneer Surface Texture: Smooth
4. Species: Grade A, Natural Variations Light Cherry
5. Perforations:
    a. Pattern # RD 6006 (Standard Veneers; Natural Variations Light Cherry)
    b. Hole size: 6 mm
    c. On center spacing: 32.0 mm
    d. % Open area: 6.0
6. Size: 24in X 24in X 3/4in
7. Edge Profile: Vector for interface with Prelude XL 15/16" Exposed Tee.
8. Edge Banding and Trim: To match face veneer
9. Noise Reduction Coefficient (NRC): ASTM C 423; 0.40
10. Ceiling Attenuation Class (CAC): ASTM C 1414; 28
11. Flame Spread: ASTM E 1264; Class A (HPVA)
12. Dimensional Stability: Standard

C. Accessories: Provide all accessories, trims and etc. needed for proper installation of system and as shown on drawings. See drawings and Interior Finish Index for additional required Axiom type trims.

2.03 METAL SUSPENSION SYSTEMS

A. Manufacturers:
    1. Avendra, LLC Preferred Manufacturers:
        a. None
    2. Approved Manufacturers:
        a. Armstrong World Industries, Inc. (888-234-5464)
        b. Rulon Company (800-227-8566)
        c. USG Interiors, Inc. (800-950-3839)
        d. Approved substitution

B. Ceiling Support System:
    1. Suspension Systems: Provide systems complete with carriers, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, fixture adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.

C. Accessories: Provide all accessories needed for proper installation of system.
    1. Hanger Wire: Manufacturer’s standard 12-guage hanger wire; secured with stainless steel anchors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which wood panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of linear wood ceilings. Verify that suspended ceiling systems are installed in strict accordance with all pertinent codes and regulations, and the manufacturer's recommendations

B. Do not proceed with installation until all wet work such as concrete, tiling, plastering and painting has been completed and thorough dried out.

C. Discrepancies: In the event of discrepancy, immediately notify the Architect. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION

A. Measure each ceiling area and establish layout of linear wood veneer flexible wall covering to balance border widths at opposite edges of each ceiling. Comply with layout shown on reflected ceiling plans and Coordination Drawings.

3.03 INSTALLATION

A. Install suspension system and panels in compliance with ASTM C636, ASTM E580, with the authorities having jurisdiction, and in accordance with the manufacturer’s installation instruction.

1. Install ceiling system in a true and even plane with straight line courses laid out symmetrically about center lines of area or as indicated.

B. Suspend main beam from overhead construction with hanger wires spaced 4 feet on center along the length of the main runner. Install hanger wires plumb and straight. The suspension system must be leveled to within 1/4 inch in 10 feet and must be square to within 1/16 inch in 2 feet.

C. Install main beams 48 inches on center with 48 inch cross tees every 24 inches at 90 degrees to the main beam. Install the 24 inch cross tees at midpoints of the 48 inch cross tees.

D. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

E. Follow the instructions found in "WoodWorks Vector Installation Instructions", LA-295693 for border treatment of the WoodWorks Vector panels. The face of the suspension system rests directly on the molding or trim flange.

F. Follow the instructions found in "WoodWorks Perimeter Trim Installation Instructions," LA-297246

G. Cut panel edges that are exposed to view will have to be treated to look like factory edges. Pre- finished peel and stick edge banding is recommended for this purpose.

3.04 LIGHTING:

A. Contractor shall be responsible for providing sufficient support on grid systems to support light and HVAC fixtures. All fixtures shall be supported at each and every corner.

3.05 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of wood ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

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SECTION 09 65 00 - RESILIENT FLOORING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Resilient Base
2. PVC Thresholds
3. Solid Vinyl Transition Edges
4. Rubber Athletic Tile Flooring

B. Related Sections:

1. Section 05 50 00 – Metal Fabrications
2. Section 09 30 00 - Tiling
3. Section 09 68 00 - Carpeting

1.02 REFERENCES

A. ASTM International Publications:

1. C241 “Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic”
2. C503 “Standard Specification for Marble Dimension Stone (Exterior)”
3. D2047 “Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine”
4. D2240 “Standard Test Method for Rubber Property—Durometer Hardness”
5. D3389 “Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform, Double-Head Abrader)”
6. E648/NFPA 253 “Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source”
7. E662/NFPA 258 “Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials”
8. F710 “Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring”
9. F1066 “Standard Specification for Vinyl Composition Floor Tile”

B. Carpet & Rug Institute (CRI)

Standard for Installation of Commercial Carpet CRI 104, Current Edition

C. Code of Federal Regulations (CFR)

40 CFR 763 - Asbestos: Appendix A - Transmission Electron Microscopy Analytical Methods

D. Occupational Safety & Health Administration (OSHA) Regulations:

1. OSHA Regulation 29 CFR Toxic and Hazardous Substances 1910-1200 Hazard Communication

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 03 30 and the following supporting data:

1. Submit manufacturer's product and maintenance data for each type of resilient flooring and accessory.
    a. Certification by resilient flooring manufacturer that products supplied for flooring installation comply with local regulations controlling use of volatile organic compounds (VOCS).
    b. Asbestos Content: Provide written certification that tile and adhesive materials contain no asbestos of any type of mixture of types occurring naturally as impurities as determined by polarized light microscopy test per Appendix A of 40 CFR 763 will be utilized on this Project.
2. Submit color selection in the form of actual sections of resilient flooring, including accessories, for each type of resilient flooring required showing full range of colors and patterns available.
3. Submit shop drawings, seaming plan, and coving details for flooring and accessories.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives and chemical-bonding compounds, including printed statement of VOC content.

C. Installer Certificates: Signed by sheet vinyl flooring system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install sheet vinyl flooring system.

1.04 QUALITY ASSURANCE

A. Single-Source Responsibility for Flooring: Obtain each type, color and pattern of flooring from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.

B. Installer: A firm with not less than five years of successful experience in installation of sheet vinyl flooring systems with chemically welded seams similar to those required for this project and which is certified by manufacturer of the sheet vinyl materials.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E662.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver tiles and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 65 degrees F. and 90 degrees F. Store tile flooring materials on flat surfaces. Move resilient flooring and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

C. Store sheet vinyl rolls upright. Move sheet vinyl floor coverings and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer.

1.06 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 degrees F. in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 degrees F.

B. Do not install resilient flooring until they are at the same temperature as the space where they are to be installed. Close spaces to traffic during resilient flooring installation.

C. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

1.07 SEQUENCING AND SCHEDULING

A. Do not install resilient flooring materials over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

1.08 EXTRA MATERIALS

A. Refer to Section 01 78 43 (01790)

PART 2 PRODUCTS

2.01 RUBBER ATHLETIC TILE FLOORING:

A. Avendra, LLC Preferred Manufactures:

1. None

B. Approved Manufacturers:

1. To Market, LLC (866-772-4772).
2. ECOsurfaces manufactured by ECORE International (800-322-1923).
3. Approved Substitution by Architect.

C. Adhesive: As recommended by Manufacturer for use intended.

D. Color: Refer to Interior Finish Index for color and other additional requirements

2.02 RESILIENT BASE

A. Avendra, LLC Preferred Manufactures:

1. IPC Door and Wall Protection Systems, Inpro Corp. (800-543-1729)

B. Approved Manufacturers:

1. Johnsonite (800-899-8916).
2. Burke Mercer Flooring Products, A Division of Burke Industries (800-669-7010).
3. Roppe Corporation (800.537.9527).

C. Resilient bases shall be 1/8" thick, size as shown in Interior Finish Index. Provide cove type at sheet vinyl, resilient tile flooring, and other hard surfaces. Job mitering of corners will not be permitted.

2.03 PVC THRESHOLD:

A. Avendra, LLC Preferred Manufactures:

1. None

B. Approved Manufacturers:

1. Johnsonite (800-899-8916).
2. Approved Substitution by Marriott International

C. Manufactured from a homogeneous composition of polyvinyl chloride (PVC), high quality additives, and colorants. All Threshold Mouldings shall comply with A.D.A. requirements of Section 4.5.2 Changes of Level. Standard formulation exceeds ASTM E648 Class 1 Flammability requirements.

1. Hardness - ASTM D2240 - Not less than 85 Shore A
2. Abrasion Resistance - ASTM D3389 - 0.22 mg/cycle
3. Slip Resistance - ASTM D2047 - Exceeds Federal Standards and ADA requirements of 0.6 for flat surfaces.
4. Fire Resistance:
   a. ASTM E648/NFPA 253 (Critical Radiant Flux) - Class 1.
   b. ASTM E662/NFPA 258 (Smoke Density) - 450 or less.
5. Adhesive: As recommended by Manufacturer for use intended.
6. Color: Refer to Interior Finish Index for color and other additional requirements.

2.04 TRANSITION EDGES:

A. Avendra, LLC Preferred Manufactures:

1. Resilient Edge Trims and Transitions:
   a. None
2. Straight Metal Edge Trims:
   a. None
3. Curved Metal Edge Trims:
   a. None

B. Approved Manufacturers:

1. Resilient Edge Trims and Transitions:
   a. Marley Flexco Co., A Soflex Company (800-633-3151)
   b. Johnsonite (800-899-8916)
   c. Burke Mercer Flooring Products, A Division of Burke Industries (800-669-7010).
2. Straight Metal Edge Trims:
   a. Schluter Systems (800-574-8481)
   b. Ceramic Tool Company, Inc. (CTC) (800-236-5230)
3. Curved Metal Edge Trims:
   a. Schluter Systems (800-574-8481)

C. Model, Size and Color: Refer to Interior Finish Index.

D. Furnish transition edges at the following locations:

1. Carpet to Carpet (Where thickness varies)
2. Carpet to Ceramic Tile
3. Carpet to Concrete

4. Tile to Tile
5. Tile to Epoxy
6. Tile to Rubber Sheet Flooring

2.05 INSTALLATION ACCESSORIES

A. Concrete Slab Primer:

B. Resilient Base Adhesives to be Non-Toxic, Low Odor, and Solvent Free with no alcohol, glycol, or ammonia. Adhesive shall be antimicrobial with no hazardous vapors and contain no carcinogenic materials, per OSHA Regulation 29 CFR 1910-1200. All containers shall contain material safety data sheets (MSDS) and be available at job site for inspection. Provide product as manufactured by W.F. Taylor Co., Inc. (800-397-4583) recommended for intended installation, as approved by resilient base manufacturer, or approved substitution.

C. Other materials, including edge strips not specifically described, but required for a complete and proper installation of resilient flooring, shall be only as recommended by the manufacturer of material to which it is applied.

PART 3 EXECUTION

3.01 INSPECTION:

A. Installer must examine the areas and conditions under which resilient flooring and accessories are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

1. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
2. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 CONCRETE SUBFLOORS OR GYPSUM CEMENT FLOOR UNDERLAYMENT:

A. Verify that concrete slabs comply with ASTM F710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, residual adhesives, adhesive removers, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by manufacturer.
2. Finishes of subfloors comply with tolerances and other requirements specified in Division 03 Section, "Cast-In-Place Concrete" for slabs receiving resilient flooring.
3. Subfloor Moisture Conditions: Before installing flooring Contractor shall verify that Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F, or as recommended by manufacturer.
4. Subfloor Alkalinity Conditions: Before installing flooring Contractor shall verify that a pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied

3.03 PREPARATION

A. General: Comply with manufacturer's installation specifications for preparing substrates to receive products indicated.

1. Comply with Armstrong Guaranteed Installation Manual F-5061, or equivalent by other listed manufacturers.

B. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

C. This Contractor to remove coatings, including curing compounds, adhesives, plastics, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush. Surface to receive new flooring shall be fully prepared, including removal of existing materials not acceptable for proper installation of new materials, as required by manufacturer. Do not use solvents.

1. Prep floor according to ASTM F710 criteria.

D. Slab Primers:

1. Gypsum Cement Floor Underlayment: Apply Armstrong "S-185 Latex Primer and Additive", or approved substitution, to gypsum subfloor liberally with a short nap paint roller or a coarse fiber brush. Avoid puddling. Use at full strength, DO NOT DILUTE.

2. 2. Allow to dry thoroughly before skimming with floor patch

E. Underlayment or Leveling Compound: Use leveling compound as recommended by flooring manufacturer for filling small cracks and depressions in subfloors. All rough areas, projections, ridges, and bumps shall be removed.

1. Vinyl Composition Floor Tile: Apply underlayment or leveling compound in compliance with manufacturer's directions.

2. Sheet Vinyl Flooring: Skim coat the entire subfloor with Armstrong "S-184 Fast-Setting Cement-Based Patch and Skim Coat", or approved substitution, using a smooth-edge finishing trowel filling in the recessed areas to provide a smooth finished substrate to receive the sheet vinyl.

3.04 INSTALLATION - GENERAL:

A. Install flooring after finishing operations, including painting, have been completed. Moisture content of concrete slabs, building air temperature, and relative humidity must be within limits recommended by flooring manufacturer's directions.

B. Patch and repair floors and walls to receive flooring for proper installation of flooring, stair accessories, and base.

C. Place flooring with adhesive cement in strict compliance with manufacturer's recommendations. Butt tightly to vertical surfaces and edgings. Scribe around obstructions and to produce neat joints, laid tight, even, and straight. Extend flooring into toe spaces.

D. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

E. Install flooring on covers for telephone and electrical ducts and other such items as occur within finished floor areas.

F. Maintain overall continuity of color and pattern with pieces of flooring installed in these covers. Tightly cement edges to perimeter of floor around covers and to covers.

G. Tightly cement flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.

3.05 RESILIENT WALL BASE INSTALLATION

A. At areas where base is required, apply resilient base to walls, columns, pilasters, casework, and other permanent fixtures, as coordinated with type of flooring. Install base in as long lengths as practicable. Tightly bond base to backing throughout the length of each piece with continuous contact at horizontal and vertical surfaces. On irregular surfaces, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

B. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.

2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.06 INSTALLATION - RUBBER ATHLETIC TILE FLOORING:

A. Recycled Rubber Flooring Installation: Comply with Manufacturer’s Technical Manual for installation procedures and techniques for recycled rubber resilient flooring installation.

B. Finish Color/Textures/Patterns: Refer to drawings for layout and Interior Finish Index for additional information.

3.07 ACCESSORIES:

A. Place resilient edge strips tightly butted to adjacent materials of type indicated and bond to substrates with adhesive. Install edging strips at all unprotected edges of flooring unless otherwise shown. Apply resilient accessories to stairs and risers as indicated and according to manufacturer's installation instructions.

3.08 CLEANING AND PROTECTION:

A. Perform the following operations immediately after installing resilient floor coverings:

1. Remove adhesive and other surface blemishes using cleaner recommended by floor covering manufacturer.

2. Sweep or vacuum floor thoroughly.

3. Do not wash floor covering until after time period recommended by floor covering manufacturer.

4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by manufacturer of resilient product involved.

C. Cover sheet vinyl floor coverings with undyed, untreated building paper or the application of two coats of a high quality acrylic floor finish such as Ecolabs "Gemini Gemstar" or Armstrong "S-480 Commercial Floor Polish "can be applied to protect the floor during construction until inspection for Substantial Completion.

D. Clean products specified in this Section not more than four days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products using method recommended by manufacturer. Strip protective floor polish that was applied after completing installation, prior to cleaning.

E. Do not move heavy and sharp objects directly over resilient floor coverings. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

3.09 FINISHING:

A. After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories.

B. Sheet Vinyl Flooring: Apply two (2) coats of a high quality acrylic floor matte shine finish (high gloss is not permitted) such as "Taski's Ombra Matte Shine Floor Finish" by Lever Industrial (800-827-5487), or approved substitution by Ecolabs, as approved by flooring manufacturer.

END OF SECTION

Revision Log

09 67 23 - RESINOUS FLOORING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fluid applied resinous floor covering and base.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete.
2. Section 06 20 00 - Finish Carpentry.
3. Section 07 92 00 - Joint Sealants.
4. Section 09 65 00 - Resilient Flooring.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

C 501-84(1992)	Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
D 570-95	Test Method of Water Absorption of Plastics.
D 635-96	Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.
D 1308-87(1993)	Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
D 2047-93	Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
D 2240-95	Test Method for Rubber Property - Durometer Hardness.

B. Military Specifications (Mil. Spec.):

MIL-D-3134F

1.03 PERFORMANCE REQUIREMENTS

A. Flooring to have a coefficient of friction of not less than 0.60 (wet and dry) when tested by ASTM D 2047.

B. Flammability: Self-extinguishing over concrete, ASTM D 635.

C. Physical Properties:

1. Hardness: Minimum 70/65; ASTM D 2240, Shore D.
2. Abrasion Resistance: Minimum 90-100 mgs lost; ASTM D 4060, CS-17 Wheel, 1,000 cycles.
3. Impact Resistance: Minimum 16 ft.lbs with cracking, delaminating, or chipping; MIL-D-3134F.
4. Flexural Strength: 4,500 psi ASTM C580
   10,000 psi ASTM D790

4. Compressive Strength: 12,000 psi at 7 days; ASTM C 579.
5. Tensile Strength: 2,500 psi ASTM C 307
   6,000 psi ASTM D 638
6. Water Absorption: Maximum 0.10%; ASTM D 570.
7. Adhesion; ACI 503R: 350 psi 100% Concrete failure.
8. Chemical Resistance: ASTM D 1308; no effect when exposed to following reagents for 7 days:
   a) Acetic acid: 5 percent solution.
   b) Ammonium Hydroxide: 10 percent solution.
   c) Citric Acid: 5 percent solution.
   d) Foods: Coffee, Tea, Milk, Coca Cola Syrup.
9. Hydrochloric Acid: 10% solution.
10. Isopropyl alcohol.
11. Mineral Oil.
12. Nitric Acid; 5% solution.
13. Phosphoric Acid: 10% solution.
14. Sodium hydroxide: 20% solution.
15. Urine, animal.

D. Approved by NSF and local Health Department for applications indicated.

1.04 QUALITY ASSURANCE

A. Materials used in floor surfacing to be products of a single manufacturer.

B. Installer:

1. Must be approved by manufacturer of floor surfacing materials. Contractor to furnish a written statement from manufacturer that installer is acceptable.
2. Contractor to have proven experience with specified system.

1.05 SUBMITTALS

A. Samples: Submit two 6 by 6-inch cured samples of each floor finish or color combination. Obtain specific approval for degree of smoothness of finish.

B. Certified Test: Submit certified reports of tests specified herein for cured flooring systems.

C. Manufacturer's Application Instructions: Submit complete instructions for application of flooring system including any precautions or special handling instructions required to comply with applicable safety regulations and codes.

D. LEED Submittals:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For marble chips, aggregates, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
   a. Include statement that indicates cost for each product having recycled content.
2. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.

E. Shop Drawings: Show installation of cove base and base termination details, and details at floor material transitions.

F. Test Data: Submit test data on slip resistance (coefficient of friction) for floor materials. See PERFORMANCE REQUIREMENTS above.

G. Maintenance Instructions: Submit current copies of flooring manufacturer's printed recommendations on maintenance methods and products for flooring system.

1.06 DELIVERY AND STORAGE

A. Deliver materials to project site in unopened bags and containers clearly labeled with name of manufacturer, type of material, batch number, and date of manufacture. Store materials, other than aggregates, away from fire, sparks, or smoking areas. Maintain storage area between 50 degrees Fahrenheit and 90 degrees Fahrenheit.

1.07 ENVIRONMENTAL CONDITIONS

A. Maintain ambient room and floor temperatures at 50 degrees Fahrenheit, or above, for a period extending from 48 hours before installation until one week after installation. Concrete to receive surfacing shall have cured for at least 28 days and shall have been free of water for at least 7 days.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specification based upon products by General Polymers Corporation. Subject to compliance with the requirements and Architect's approval, provide the specified products or equal products by one of the following:

1. General Polymers Corporation, Cincinnati, OH, 513 761-0011.
2. Stonhard, Inc., Maple Shade, NJ, 800 257-7953.
4. Dur- a-flex, East Hartford, CT 800 253-3539
6. Key Resin Co., Miamiville, OH, 513 576-6589.
7. Tnemec Co., Inc., Kansas City, MO, 816 483-3400.

B. Equal Products: As approved.

2.02 MATERIALS

A. Basis of Design: "Ceramic Carpet" #400 epoxy flooring system by General Polymers; a seamless, high performance, multi-component, slip-resistant, pigmented, fluid-applied mortar floor covering composed of graded quartz aggregate in an UV resistant matrix.

1. Colors: At least two colors of each type to be selected by Architect from manufacturer's full range.
2. System Thickness: 1/8 inch nominal.
3. Types: As shown on the Drawings or Interior Finish Index:

Type A: "Ceramic Carpet" #400; by General Polymers Corp.: 1/8" a seamless high performance epoxy flooring system,

Type B: Dur-A-Quartz by Dur-a-Flex; 1/4" decorative seamless flooring system.

Type C: Shop Floor; by Dur-a-Flex; 1/8" solid color seamless flooring system

B. Termination Strips: Prefabricated cove strips and wall channels appropriate for the conditions shown; manufacturer's standard material.

C. Reducers: Aluminum; clear anodized; widths as shown except provide full width of wall thickness where reducer occurs in door opening; manufacturer's standard slip resistant profile.

D. Divider Strips: "L" type white alloy zinc; minimum 16-gage; depth as required for type and thickness of application.

1. Configuration or attachment to provide for secure system of anchoring all strips in floor.

E. Waterproofing: Membrane type recommended by resinous flooring manufacturer.

F. Sealant: Material recommended by resinous flooring manufacturer.

2.03 MIXING

A. Proportion and mix floor surfacing components in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.01 PREPARATION

A. Examination: Examine surfaces to receive flooring and verify that condition is satisfactory for installation; notify Architect of any conditions deemed unsatisfactory for installation; installation of flooring materials is understood as acceptance of substrates as satisfactory. Remove debris detrimental to flooring system, and dirt, oil, grease, and surface coatings affecting bond.

B. Concrete: Test for moisture content; install no flooring over concrete until slabs have been cured and are sufficiently dry to achieve permanent bond with coating as determined by material manufacturer's recommended bond and moisture test.

C. Surface Preparation: As specified under PREPARATION in Section 01 73 00 EXECUTION.

D. Protect adjacent surfaces not scheduled to receive flooring by masking, or by other means, to maintain these surfaces free of flooring material. Provide adequate ventilation and fire protection at all mixing and placing operations. Prohibit smoking or use of spark or flame producing devices within 50 feet of any mixing or placing operation.

3.02 INSTALLATION

A. Install floor materials in conformance with manufacturer's instructions.

B. Non-Scheduled Spaces: Provide resinous flooring at the following non-scheduled areas unless otherwise specified:

1. Closets and alcoves off spaces.

2. Under permanently built-in casework or equipment.

3.03 APPLICATION

A. General: Apply according to manufacturer’s recommendations.

B. Bondcoat: Where recommended by manufacturer, apply bondcoat uniformly over entire area to receive flooring using brush or clean steel trowels. Do not allow bondcoat to collect in depressions. Allow bondcoat to dry thoroughly before next coat is applied. Recoat porous areas or areas where bondcoat has dried.

C. Floor Surfacing: Apply surfacing materials to provide a finish floor surfacing not less than specified thickness. Surfaces to be flush, monolithic, and finished to same degree of smoothness as approved sample.

D. Integral Cove Base: Where base is scheduled, provide integral cove base where floor intersects permanent vertical surfaces, including columns, pilasters, and walls; but excluding cabinet toe spaces.

1. Provide integral cove base formed from flooring.

2. Provide cove filler strips and termination strips at top of base as recommended by flooring manufacturer and trowel material up wall to form smooth, integral transition and base 5-1/2 inches high, unless otherwise indicated.

3. Waterproofing and Sealant Joint: Provide at wall base starting approximately four inches high on substrate behind base and extending on concrete slab under flooring approximately three inches to Sealant Joint.

3.04 PROTECTION

A. Surfacing shall set for a minimum period of 48 hours before traffic is allowed on floor. Finished flooring shall be protected from traffic by covering with 30 pound building paper or other equally effective means until final acceptance of project.

END OF SECTION

SECTION 09 68 00 - CARPETING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Preparation of surfaces to receive carpeting.
2. Installation of Topcoat Sealer provided under Section 03 54 13 – Gypsum Cement Underlayment.
3. Carpet:
   a. Furnished by Owner, installed by Contractor
   b. Stretch-in Installation
   c. Direct-Glue-Down Installation
   d. Double-Glue-Down Installation
   e. Carpet with Attached-Cushion Installation
   f. Carpet with Preapplied Adhesive Installation
4. Carpet Cushion:
   a. Furnished by Owner, installed by Contractor
5. Accessories, including tack strips, adhesives tapes and all other required accessories.
6. Transition edges
7. Carpet stair nosings

B. Related Documents:

1. Seam Layout Drawings provided by Marriott International
2. Marriott International FF & E Specification Manual.

C. Related Sections:

1. Section 03 30 00 - Cast-in-Place Concrete
2. Section 03 54 13 - Cementitious Decks and Underlayment
3. Section 05 50 00 – Metal Fabrications
4. Section 09 65 00 - Resilient Flooring

1.02 REFERENCES

A. ASTM International (ASTM)

1. F710 “Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring“
2. F1869 “Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”

B. Federal Specifications (FS)

1. FS DDD-C-0095 Carpet and rugs, wool, nylon, acrylic, modacrylic, polyester, polypropylene

C. Carpet & Rug Institute (CRI)

1. CRI 104 Carpet Installation Standard

D. Occupational Safety & Health Administration (OSHA) Regulations:

1. OSHA Regulation 29 CFR Toxic and Hazardous Substances 1910-1200 Hazard Communication

E. U.S. Department of Commerce (DOC)

1. Federal Flammability standard DOC FF 1-70 (Methenamine Pill test ASTM D2859).

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. A copy of the manufacturer's printed installation manual shall accompany Bid for review and approval by the Owner's Representative.

2. Shop Drawings showing layout and seaming diagrams. Indicate pile or pattern direction and locations and types of edge strips. Indicate columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet. Show installation details at special conditions.

B. LEED Submittals:

1. Product Data for Credit EQ 4.3:

a. For carpet, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
b. For carpet cushion, documentation indicating compliance with testing and product requirements of CRI's "Green Label" program.
c. For installation adhesive, including printed statement of VOC content.

2. Laboratory Test Reports for Credit EQ 4: For carpet and installation adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Firm with not less than 5 years of experience in installation of commercial carpeting of type, quantity, and installation methods similar to work of this Section, or can demonstrate compliance with its certification program requirements.

B. Successful vendor shall be responsible for field measurements to determine carpet layout.

C. All products shall comply with the Carpet and Rug Institute Indoor Air Quality Testing Program (Green Label).

D. Carpet Surface Burning Characteristics: Provide carpet identical to that tested for the following fire performance characteristics, per test method indicated below, by UL, ASTM , E648, or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify carpet with appropriate markings of applicable testing and inspecting organization.

2. Test Method: DOC FF 1-70

3. Rating: Pass

E. The carpet contractor is responsible for reviewing carpet manufacturer's published installation instructions prior to installation. This includes understanding dye lots, pattern sequencing, pattern matching and any special instructions. Failure to abide by the manufacturer's instructions could result in a backcharge to contractor for corrections to the installation.

F. Contractor is responsible for damages to work performed by others including but not limited to telephone or television wires placed in front of the tack-strip running the perimeter of the room.

G. The installation contractor is responsible for verification of quantities within fourteen (14) days on new construction. The contractor shall provide take-offs of all carpet and padding, as required for a complete installation. No compensation will be allowed to the installation contractor for materials and labor that may be required to install additional carpeting because of incorrect quantity takeoffs.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with CRI 104, Section 5, “Storage and Handling”.

B. Do not deliver carpet until areas of building are ready for carpet installation. Provide protection from loss or damage.

C. Store materials in original undamaged packages and containers, inside well-ventilated, dry area protected from weather, moisture, soilage, extreme temperatures and humidity. Lay flat, blocked off ground. Maintain minimum temperature of 68 degrees F. (20 degrees C.) at least three days prior to and during installation in area where materials are stored. Never stack carpet more than two rolls high or stand up on roll ends on job site. Do not bend or fold carpet in storing.

D. Carpet shall never be stacked more than five (5) rolls high.

1.06 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, “Site Conditions, Temperature and Humidity”.

B. Do not commence with carpet installation until painting and finishing work is complete and ceilings and overhead work has been tested, approved, and completed.

C. In areas to receive carpet, room temperatures shall be maintained at 65-90 degrees F and with relative humidity ranging between 20 and 65 percent minimum for 72 hours prior to, during, and 72 hours following application. Materials shall be conditioned at application temperature and humidity at least 24 hours prior to application. Provide sufficient lighting for carpet installation.

D. Contractor shall provide method approved by the Architect and Owner's Representative to mechanically exhaust all spaces to receive carpet to the exterior during installation and a minimum of 72 continuous hours, or length of time required by the manufacturer or Owner after installation.

E. Subfloor Moisture Conditions: Before installing carpet Contractor shall verify that Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F, or as recommended by manufacturer.

F. Subfloor Alkalinity Conditions: Before installing carpet Contractor shall verify that a pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied.

1.07 WARRANTY

A. Stretch-in installation labor shall be guaranteed for one (1) year. Sixty days after installation, the Subcontractor is to re-stretch all carpet where necessary and as directed by Marriott Representative.

B. Tred-Mor Dubl-Stik installation labor shall be guaranteed for five (5) years.

C. The adhesive manufacturers offer five (5) year warranty on their adhesives used on a Tred-Mor Dubl-Stik installation.

D. It is the carpet Contractors responsibility to fill out the adhesive manufacturer warranties. The warranty must be returned to the adhesive manufacturer and a copy sent to the Contractor's representative.

1.08 EXTRA MATERIALS

A. Refer to Section 01 78 43 for requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Carpet: Refer to Interior Finish Index

2.02 CARPET CUSHIONS

A. The following carpet cushion information is provided solely for use by the Contractor to determine locations.

B. Rubber padding - 50 oz. Badger waffle type pad shall be installed in Guest Rooms and suites unless TredMor pad is specified.

C. Rubber padding - 68 oz. Granite IV flat type pad shall be installed in Public Areas and Guest Room Corridors unless Tred-Mor pad or direct glue-down is specified.

1. Rubber padding shall be cemented to the floor with a liquid mastic around the perimeter and in an use pattern across the field.

2. Rubber padding joints shall be at a right angle to all carpet seams. When this is not practical, shift the pad so that the joints are several inches from the carpet seams. All padding joints shall be taped.

D. Tred-Mor Padding:

1. 1562 used in Ambulatory Guest Rooms (except at ADA accessible Guest Rooms)

2. 2568 used in Guest Room Corridors and other Public Areas not listed below

3. 2580 used in Assembly Areas

2.03 ACCESSORIES

A. Seaming: Hot-melt seaming adhesive or similar product recommended by carpet manufacturer for taping seams and buttering cut edges at backing to form secure seams and prevent pile loss at seams.

B. Hot melt tape – (all stretch installation areas except Dubl-Stik installations)

4. Avendra, LLC Preferred Manufacturers:

a. None

5. Approved Manufacturers:

a. "6 inch - Super 3S Tape"; ORCON (800-227-0601)

C. Carpet Adhesive: (All direct glue-down areas except double-stik installations)

1. Non-staining type as recommended by carpet manufacturer for use intended, complying with the following:

a. Carpet adhesive to be non-toxic, low odor, and solvent free, with no alcohol, glycol, or ammonia. Adhesive shall be antimicrobial with no hazardous vapors and contain no carcinogenic materials, per OSHA Regulation 29 CFG 1910-1200. All containers shall contain material safety data sheets (MSDS) and be available at job site for inspection.

D. Carpet Adhesive - Dubl-Stik Installation

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. “No. 375 or SS-5” ("Safe-Set"); CHAPCO (Chicago Adhesive Products, Co.) (800-621-0220)

b. “Parabond” Dubl-Stik DS-902; Para-Chem, Inc. (800-763-7272)

c. “No. 880”; M-D Building Products, Inc. (800-654-0007)

E. Carpet Seam Adhesive - Dubl-Stik Installation

1. This product shall be used to join the primary backs of tufted carpet and the woven backs of Axminster carpet together.

a. All seam adhesives shall be latex type.

2. Avendra, LLC Preferred Manufacturers:

a. None

3. Approved Manufacturers:

a. “Seam Cement #112”; CHAPCO (Chicago Adhesive Products, Co.) (800-621-0220)

b. “Parabond Premium Latex Seam Sealer M267”; Para-Chem, Inc. (800-763-7272)

c. Substitution as approved by Marriott International

F. Hot Melt Tape - Dubl-Stik Installation

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. “CT-7DS”; ORCON (800-227-0601)

3. NOTE: MANDATORY USE WITH BRINTONS AND COURISTAN CARPETS

4. The use of hot melt tape is optional and depends on the carpet installer's preference. There are instances during some installations, such as pattern matching, where the hot melt tape may simplify and speed up installation.

5. CAUTION: DO NOT USE A SILICONE TREATED TAPE. THE SILICON WILL PREVENT THE ADHESIVE FROM ADHERING TO THE BACK SIDE OF THE TAPE.

G. Tack Strips:

1. Water-resistant plywood strips as required to match pad thickness and in compliance with CRI 104, Section 11.3.

2. Commercial with 3 rows of pins.

a. Type 1: Pre-nailed (Concrete) for anchoring into concrete sub-floor.

b. Type 2: Extra long nails for cementitious leveling bed over plywood sub-floor.

H. Concrete Leveling and Patching compounds:

1. For areas up to 4 square feet:

a. Feather finish, use to smooth ridges, fill cracks, gouges and joints.

1) "SD-F"; Ardex (724-203-5000)

b. Trowelable underlayment patch for thickness up to ½ inch without aggregate; up to 1 inch with aggregate. Can be feather edged.

1) "SD-P/ Primer P-82"; Ardex (724-203-5000)

2. For areas exceeding 4 square feet:

a. Self-leveling, pourable or pumpable underlayment for thicknesses up to 5 inches. Can be feather edged.

1) "K-15/Primer P-51"; Ardex (724-203-5000)

2.04 SEALING OF SUBSTRATE

A. Topcoat Sealer: Flooring Contractor to install product provided under Section 03 54 13 – Gypsum Cement Underlayment prior to installation of carpet.

1. Verify topcoat sealer and carpet adhesive products to assure compatibility.

2.05 TRANSITION EDGES

A. Carpet Transition Edges: Refer to Interior Finish Index and Section 09 65 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.

B. Concrete Subfloors: General Contractor shall verify that concrete slabs comply with ASTM F710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the carpet and carpet cushion manufacturers, including ASTM F1869. It is essential that moisture tests be taken on all concrete floors regardless of age and grade level. The test should be in accordance with ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride. One test should be conducted for every 1000 sq. ft. of flooring and the results not exceed 3 lbs. Per 1000 sq. ft. in 24 hours. If the test results exceed the limitations, the installation must not proceed until the problem has been corrected.

2. Subfloor Alkalinity Conditions: Before installing carpet Contractor shall verify that a pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied.

3. Subfloor finishes comply with requirements specified in Division 03 Section “Cast-in-Place Concrete” for slabs receiving carpet.

4. Subfloors are free of cracks, ridges, depressions, scale and foreign deposits. Sand smooth or fill voids to obtain a smooth level substrate, any noticeable deviation in flooring may be rejected.

5. Ensure floors are level with maximum surface variation of ¼" in 10'.

C. Report conditions contrary to Contract requirements which would prevent a satisfactory installation. Proceed with installation only after unsatisfactory conditions have been corrected, as approved by General Contractor.

1. Failure to call attention to any defects or imperfections will be construed as acceptance and approval of the subfloor.

2. Installation indicates acceptance of substrate conditions at the time of installation.

3.02 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written instructions for preparing substrates indicated to receive carpet installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

1. Level subfloor within 1/4" in 10', noncumulative, in all directions. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the following:

1. Carpet manufacturer

2. Carpet cushion manufacturer

3.03 INSTALLATION

A. Direct-Glue-Down Installation: Comply with CRI 104, Section 8, "Direct Glue-Down Installation"

1. In the case of direct glue-down, carpet glued to floor, no padding required, follow the manufacturers specifications.

2. Milliken modular carpets and Collins & Aikman uniback carpet requires the use of their own adhesives when installing their products.

B. Double-Glue-Down Installation: Comply with CRI 104, Section 9, "Double Glue-Down Installation"

C. Carpet with Attached-Cushion Installation: Comply with CRI 104, Section 10, "Attached Cushion"

D. Carpet with Preapplied Adhesive Installation: Comply with CRI 104, Section 10.4, "Pre-Applied Adhesive Systems"

E. Stretch-In Installation: Comply with CRI 104, Section 11, "Stretch-In Installation"

1. Install tack strip with adhesive, drill and pin, or nailing, or combination, where required for adequate strength.

2. Locate Tack strip 1/4 inch from wall to conceal carpet edge between stripping and base of wall. Strip entire perimeter of each carpeted space and at obstructions and cutouts.

3. Tap down tackstrip pins in Guestrooms at Entrances, Bathroom, Closets, and Balconies.

4. Tred-Mor Pad Installation

a. Refer to Scope of Work, and the Interior Design Drawings, for Tred-Mor pad locations. Tred-Mor padding will be installed using the stretch-in installation method listed above unless Tred-Mor Dubl-Stik is specified.

5. Power stretch carpet uniformly in both directions the exact amount recommended by carpet manufacturer; trim edges, secure to stripping and conceal behind edge of stripping.

   a. Stretch-in installations must be power stretched uniformly length and width 1% to 1.5% using a power stretcher.

   b. When Graphic Action Back Carpet is specified, a uniform length and width power stretch of .75 % to 1% is acceptable.

6. Use a carpet covered minimum 48 inch long 4 x 4 buffer block between power stretcher and wall to prevent damage to wall. Use a wall trimmer to trim carpet along walls and abutments. This Contractor shall be responsible for wall damage caused by installation Work.

   a. Trimmer must be adjusted to leave sufficient excess carpet to tuck into gullies.

F. Stair Installation: Comply with CRI 104, Section 12, “Carpet on Stairs”

G. Comply with carpet manufacturer’s written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

   1. Level adjoining border edges

H. Do not bridge building expansion joints with carpet.

I. Cut and fit carpets to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

   1. Check matching of carpet before cutting and ensure there is no visible variation between cut pieces.

   2. Cut carpet, where required, in a manner to allow proper seam and pattern match. Ensure cuts are straight and true and unfrayed.

J. Carpet shall extend to the back of all toe spaces, under all millwork, cabinetwork, convectors, bookshelving, and similar items to the limiting planes of the floor surface. Where carpet terminates at a doorway, termination of carpet shall occur under the edge of the closed door, or at the side of the threshold where this is required. Cut and fit carpeting to all obstructions protruding from the floor surface, such as columns, pipes, thresholds, electrical, and telephone outlets, etc. All raw edges shall be sealed and securely and neatly tucked into place.

K. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

L. Install pattern parallel to walls and borders.

M. Carpet shall be installed by experienced carpet layers in an approved manner, using Marriott’s recommended adhesive and procedures, as approved by carpet manufacturer. Install carpet with pile running in the same direction, unless specifically directed to do otherwise.

N. Install carpet cushion seams at 90-degree angle with carpet seams.

O. The final carpet pattern, layout, edge binding locations shall be as directed and approved by Owner's Representative. All associated installation shall be by this Contractor.

3.04 TRED-MOR DUBL-STIK INSTALLATION

A. Glue-Down Cushion - Pressure Sensitive Adhesive:

1. After all floor preparation is completed, the layout of the cushion should be planned. Cushion should be installed in longest lengths possible with consideration for traffic patterns and seam placement. Cushions seams should not be directly under carpet seams and generally should be at right angles to them. When this is not possible, shift cushion or carpet so that cushion seams are at least 6" to one side of carpet seams. After completing the cutting and fitting, begin gluing. Fold back the cushion and begin applying the adhesive to the floor. Refer to adhesive manufacturer's instructions for trowel size. Coat the floor with a continuous thin film of adhesive. A thick film will not be permitted. The optimum time to install cushion onto the adhesive is after the adhesive has become tacky dry. Do not lay the cushion into wet pressure sensitive adhesive.

2. Gluing Cushion to Floor:

a. Pressure Sensitive Adhesive: For most installations, a 1/32" x 1/32" x 1/32" trowel size will be sufficient. However, if floor is very porous (rough concrete, particle board, plywood, etc.), a larger trowel notch may be required. Some pressure sensitive adhesives can be applied more quickly to smooth subfloors by using a short nap paint roller. Comply with the adhesive manufacturer's instructions covering the specific adhesive. After adhesive application has been completed, place the cushion onto the adhesive and adjust where necessary to ensure there are no gaps at seams and whether full contact is made with adhesive. Smooth out air bubbles with a 2' piece of carpet core or the bottom of a tool box shelf.

3. Glue Down Carpet to Cushion:

a. Multipurpose - Carpet Adhesive - Premium Quality: For use between the cushion and tufted carpets with a secondary back or woven carpets, only a quality Brand Premium Adhesive should be used. Conform to manufactures recommendations and spread with a properly selected notched trowel. Maintain proper notch size throughout the installation.

b. Laying Out Carpet and Installing: Follow industry accepted methods for a glue-down installation. All carpet should be spread in the room 24 hours prior to actual installation with room temperature between 65 degrees and 95 degrees F. Open carpet and spread it out over cushion. Roughly locate the carpet three to four inches longer than the area measurement. Align all breadths in their proper positions and trim the seams. All seam edges must be trimmed using the appropriate seam cutting tools, according to the carpet manufacturer's recommendations, before spreading the adhesives. Do not double cut carpet seams where cutting tool will penetrate the cushion; this can weaken the finished seam. Select the appropriate adhesive and trowel notching, as recommended for the coarseness of the carpet backing. On tufted carpets with a secondary back and on woven carpets, the trowel notch shall be large enough for the adhesive to make good contact with the recessed areas of the backing. Very coarse textured backings, rough porous concrete surfaces, or other unusual conditions, can require a trowel with deeper notches as recommended by the adhesive manufacturer. Lack of adhesion caused either by a lower quality adhesive or wrong trowel selection is the number one cause of installation failure.

c. The adhesive is to be spread uniformly over the cushion with selected trowel. After sufficient open time, the carpet should be pressed down into the adhesive using a 2-foot section of carpet tube or a stiff bristlebroom (not nylon), or a roller weighing no more than 35 pounds.

d. The following types of carpet can be glued down to cushion: woven wilton, woven axminster, tufted with secondary backing of jute or synthetic, tufted carpet with no

secondary backing (unitary backing), tufted carpet with thermo-plastic (hot melt) application of secondary backing of jute or polypropylene, or cushion-bonded.

e. Floor preparation and testing, as well as cutting, fitting and laying of cushion and carpet are essentially the same for all types. However, the type of adhesive and the depth of the notches in the trowel (which controls the amount of adhesive being applied) depends on whether you are installing cushion or the carpet and on what type floor and carpet backing. Refer to carpet manufacturer or adhesive manufacturer's instructions for recommendations.

3.05 SEALING CUT EDGES

A. To prevent fraying and raveling at all seams and transition areas, a continuous bead of seam adhesive must be applied to the first edge where the face yarn enters the backing.

B. On woven carpet, all cut edges at seams and transition areas must be secured with a latex seam adhesive immediately following the seam trimming.

3.06 SEAMING

A. Install pad and carpet seams in accordance with manufacturer's published instructions.

B. Locate pad seams at right angles to carpet seams. Where not possible to locate at right angles, locate pad seam minimum 6 inches away from carpet seams. Butt pad edges tightly together to form seams without gaps. Tape pad seams.

C. Maintain uniformity of carpet direction and lay of pile. At doors, center seams under doors; do not place seams in traffic direction at doorways.

D. Orcon Super 3S Wide tape will be used on all public area seams specifying hot melt tape.

E. The seaming iron with heat shield must be of proper size, matching the hot melt tape being used.

F. The proper head setting and exposure time must be used to assure proper transfer without creating damage to backing or pile yarn.

G. Orcon Super 3S tape will be used in Guest Rooms and suites where seams are specified.

H. Cutting and Seaming Plan:

1. Guest Room and Suites: Refer to the Interior Design Drawings seaming layouts.

a. If the Marriott Regional Warehouse is used, the carpet will arrive pre-cut and labeled.

b. Public Areas: Refer to the Interior Design Drawings seaming layouts and the carpet suppliers seaming layouts.

c. If the Marriott Regional Warehouse is used, the Public Area carpet will arrive in full uncut rolls.

I. Where conflicts between Owner’s requirements and manufacturer’s requirements occur, use Owner’s requirements.

3.07 ACCESSORIES

A. Provide carpet edge guard where edge of carpet is exposed; anchor guards to substrate. Edge guard shall be used in all doorways or openings where no sill is installed or as required.

B. Stair Nosing: Coordinate with installation of carpet so that edge of the carpet is installed under edge of nosing or otherwise protected from unraveling.

C. Base (in corridors): Carpet Base, to match adjacent floor.

1. Install carpet base prior to installing carpet, aligned straight and level. Neatly fit against floor carpet.
2. Fix the carpet base to walls using a manufacturer approved adhesive. Mechanically attach the base to the wall at the bottom edge of surging when required. Staples shall not be permitted.

3.08 ADJUSTING

A. Stretch-In Installation: Restretch carpet sixty days after Substantial Completion, as directed by Owner.

3.09 CLEANING AND PROTECTION

A. Comply with CRI 104, Section 15, “Protection of Indoor Installation”.

B. Remove and dispose of debris and unusable scraps daily.

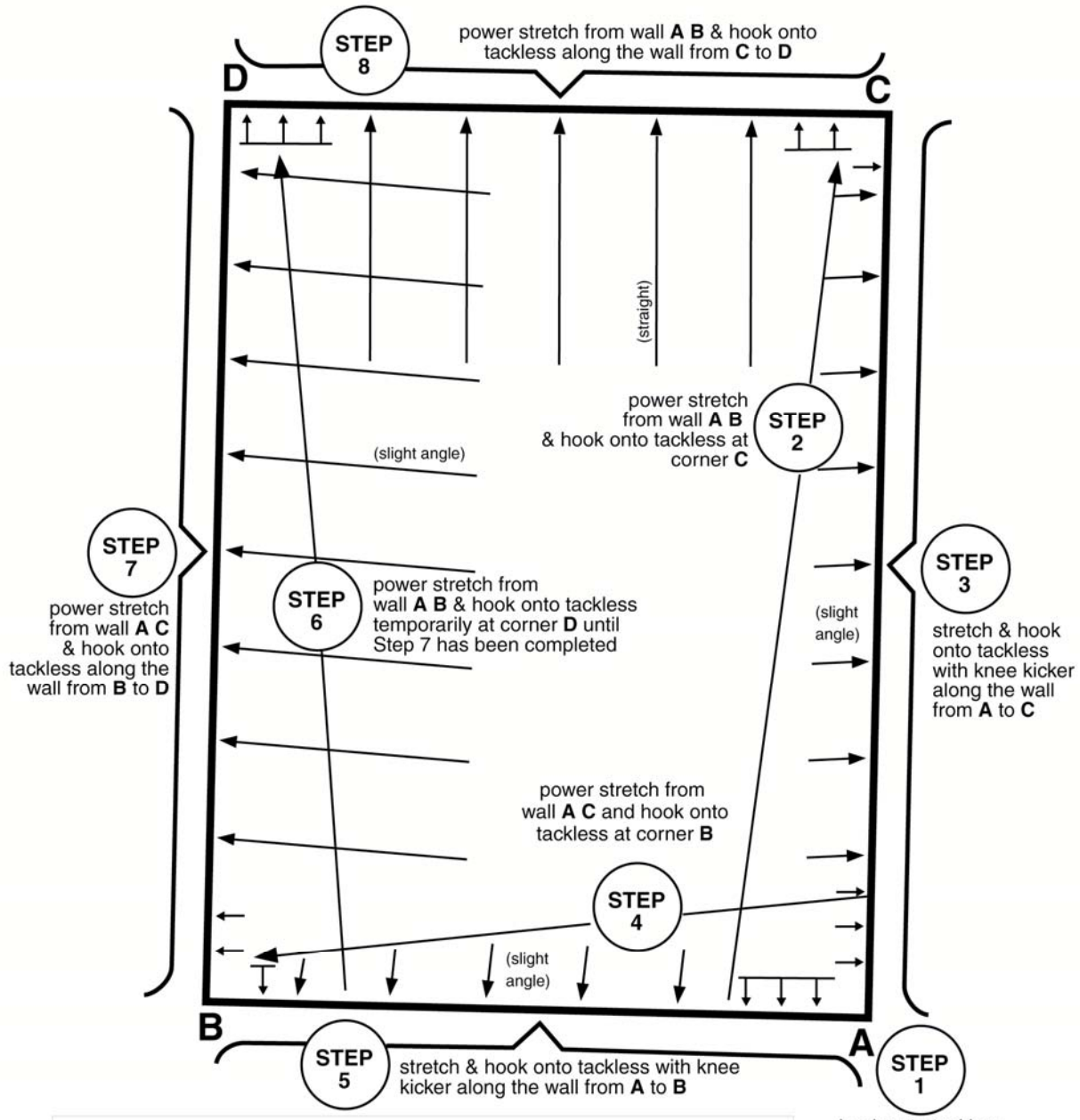
C. Vacuum carpet daily using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors. Knock down tacks at entries to baths and guest rooms (to protect feet).

D. Maintenance Materials: Deliver specified overrun (if any) and usable scraps of carpet to Owner's designated storage space, properly packaged (paper wrapped) and identified. Usable scraps are defined to include roll ends of less than 9'-0" length, and 3'-0" wide. Dispose of smaller pieces as "construction waste".

E. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

TUFTED

Amount of Stretch as per the Carpet Manufacturer's Recommendation
In Absence of Carpet Manufacturer's Recommendation, Use Diagram Below



STRETCH:	Length	Width
Jute Secondary Backing:	"drum tight"	"drum tight"
Synthetic Secondary Backing:	1% - 1 1/2%	1% - 1 1/2%

NOTE: TO BE USED FOR ALL BRANDS

END OF SECTION

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SECTION 09 72 00 - WALL COVERINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Vinyl Wall Covering
    a. Furnished by Owner, installed by Contractor
2. Prime Coat on Walls
3. Adhesives and Cleaning of Adjacent Surfaces
4. All accessories for complete installation

B. Related Sections:

1. Section 09 21 16 - Gypsum Board Assemblies
2. Section 09 90 00 - Painting

1.02 SYSTEM DESCRIPTION

A. Contractor is responsible for receiving and handling on site and installing wall covering material furnished by Owner and will fill out and process all receiving reports furnished by Owner.

B. Provide strippable adhesive and primer for all wall covering.

C. Contractor shall provide wall covering quantity take-offs to the Owner within 45 days of award of the contract.

1.03 SUBMITTALS

A. Product Data: Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Provide certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).
2. Provide maintenance data including methods for maintaining wallcovering as well as precautions for use of cleaning materials and methods that could be detrimental to finishes and performance.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
2. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content and chemical components.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed five projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Single Source Responsibility: Provide adhesives and primers produced by the same manufacturer.

C. Coordination of Work: Review Sections in which primers are provided to ensure compatibility of the total systems for various substrates.

1. Notify the Owner's Representative of problems anticipated using the materials specified.

D. Mockups: Provide a sample application in one Guest Room for acceptance by the Owner's representative and to serve as a sample standard of quality for the balance of the work. Rework sample room if necessary to obtain Owner's acceptance.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store wall-covering in clean and dry area where temperatures are maintained at minimum 40 degrees F. with normal humidity. Do not store in upright position.

B. Take precautionary measures to prevent fire hazards with adhesives and solvents.

C. Where toxic materials and both toxic and explosive solvents and adhesives are used, appropriate precautions and proper ventilation must be provided.

D. Handle and store materials at the project site in original packages or containers clearly labeled to identify manufacturer, brand name, quality or grade, and fire hazard classifications.

E. Contractor is responsible for theft or damage to stored materials. Exercise care to prevent damage during delivery, handling and storage.

1.06 PROJECT CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install wall covering until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1. Maintain surfaces and materials at constant minimum temperature of 60 degrees F and max temperature of 90 degrees F in areas of installation for at least 72 hours before and 48 hours after the application of materials.

2. Install only when humidity conditions approximate building design humidity.

B. Lighting: Do not install wall covering until a lighting level of not less than 15 foot-candles (160 lux) is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the wall covering manufacturer for full drying or curing.

D. Remove wall covering from its packaging and allow to acclimatize to the area of installation 24 hours.

E. Ensure maximum surface moisture conforms to wallcovering manufacturer's requirements and surface exhibits negative alkalinity.

1.07 EXTRA MATERIALS

A. Refer to Section 01 78 43 for requirements.

PART 2 MATERIALS

2.01 MATERIALS

A. Wallcovering: Refer to Interior Finish Index.

2.02 FIRE HAZARD CLASSIFICATION

A. Provide materials bearing the UL label and marking, indicating the fire hazard classification of the wall covering as determined by ASTM E84.

2.03 WALL COVERING PRIMER/ADHESIVE

A. Approved Manufacturers:

1. Avendra, LLC Preferred Manufactures:
    a. None
2. Approved Manufacturers:
    a. Refer to Interior Finish Index

B. Manufacturer's recommended adhesive, primer, and sealer manufactured expressly for use with the selected wallcovering. Provide materials that contain mildew inhibitors that are nonstaining to the wall-covering.

2.04 ACCESSORIES

A. Masking Tape:
1. Avendra, LLC Preferred Manufactures:
    a. None
2. Approved Manufacturers:
    a. "General Purpose Type"; 3M Adhesives, Coatings and Sealers Div. (612-733-1140)

2.05 GRAPHIC WALL COVERING PRIMER/ADHESIVE

A. Manufacturer's recommended adhesive, primer, and sealer manufactured expressly for use with the selected Graphic wallcovering. Provide materials that contain mildew inhibitors that are nonstaining to the wall-covering.
1. Avendra, LLC Preferred Manufactures:
    a. None
2. Approved Manufacturers:
    a. Refer to Interior Finish Index
        1) Primer: As recommended by Manufacturer
        2) Adhesive: As recommended by Manufacturer

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substrates for compliance with requirements for moisture content and other conditions affecting performance of Work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
1. Refer to Section 09 21 16 - Gypsum Board Assemblies for the levels of gypsum board finish per GA-214 required for a proper substrate to apply the wall coverings.
    a. Wall Covering: Level 4 Finish required.
    b. Graphic Wall Cover: Level 5 Finish required.

B. Ensure surfaces to receive all covering are clean, true, and free to irregularities. Inspect surfaces before commencing work and report defects in writing to the Owner's representative.

C. Ensure wall surface flatness tolerances do not vary more than 1/8" in 10 feet, nor vary at a rate greater than 1/16" per running foot.

D. Schedule installation of wallcovering as late as possible in the construction schedule to prevent damage during construction and movement of materials.

E. Inspect wall covering for defects. Do not install defective wall covering. Notify Owner's representative of any defects immediately.

1. Notify the Owner's Representative of variations in color or pattern match. Do not continue with work until instructed by Owner's Representative.

3.02 PREPARATION

A. Comply with manufacturers written instructions for surface preparation.

B. Test surfaces to receive wallcovering with a moisture meter. Do not install wallcovering on surfaces with a moisture content exceeding 4%.

C. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, and dirt.

D. Prepare substrates to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, and defects.

1. Painted Surfaces: Treat areas susceptible to pigment bleeding.

2. Metals: If not factory primed, clean and apply rust-inhibitive zinc primer.

3. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electric moisture meter.

E. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finishes with fine sandpaper.

F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.03 INSTALLATION - GENERAL

A. General: Comply with wall-coverings manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

3.04 INSTALLATION - PRIMER

A. Prime all new gypsum board with primer recommended by wall covering manufacturer. Apply primers full strength, no thinning permitted. .

3.05 INSTALLATION - WALLCOVERING

A. Install wall-covering prior to installation of all wall mounted plumbing, cabinets, molding and electrical fixtures.

B. Cut wall-covering panels in roll number sequence. Change run numbers at partition breaks and corners only. Install wall covering with no gaps or overlaps. Match pattern 72 inches above finish floor. Install seams vertical and plumb at least 6 inches from outside corners and 3 inches from inside corners. No horizontal seams. Remove air bubbles, wrinkles, blisters, and other defects. Trim edges for color uniformity, pattern match, and tight closure at seams and edges. Double cut seams.

1. Install non-match panels on the hanging surface, reversing every other panel unless otherwise recommended by the manufacturer. Match side joints for continuity.

2. Fill in over doors and windows as work progresses with panels cut in consecutive order from the roll.

3. Do not allow vertical joints to occur closer than 6 inches from outside corners not indicted to receive new corner guards.

a. Outside corners receiving corner guards should be used as a location to adjust wall-covering needing realignment due to “out of–plumb” walls.

C. Notify the Owner's Representative immediately of variations in color or pattern match. Do not continue with work until instructed by the Owner's Representative.

D. Refer to Joint Sealants Section 07 92 00 for sealant application at edges of wallcoverings where the wallcovering meets other materials.

3.06 CLEANING

A. Remove all excess adhesive from joints, wall mounted equipment, door frames, and other similar items. Use cleaning methods recommended by the wall-covering manufacturer. Replace strips that can not be cleaned.

END OF SECTION

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SECTION 09 90 00A - PAINTING

Note: This Section is comprised of two (2) specification sections. The second section contains the Paint Schedule.

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section includes surface preparation and the application of paint materials to exposed interior and exterior items and surfaces scheduled. Surface preparation, prime and finish coats specified are in addition to shop-priming and surface treatments.

2. Paint all exposed surfaces, whether or not colors are designated, except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same color as similar adjacent materials or surfaces. If color or finish is not designated, the Owner will select from standard colors or finishes available.

3. Except in mechanical and electrical rooms, paint all exposed plumbing, heating, fire protection, and electrical material to match the walls and ceilings of that area unless noted otherwise. This shall include, but not be limited to, pipes, sprinkler piping, insulation, conduit, ducts, access panels, grilles, diffusers, hangers, exposed steel and iron supports, HVAC and electrical equipment that do not have a factory applied finish, whether the adjacent surfaces receive paint or not, and the like. Include dampers or baffles behind grilles.

4. Unless noted otherwise, painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, sprinkler heads, or labels.

a. All louvers and grilles to be painted to match adjacent surfaces.

b. Labels: Do not paint over Underwriter's Laboratories, FMG or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

B. Related Sections:

1. Prime coat on new hollow metal work shall be furnished under the "Steel Doors and Frames" Section 08 11 13.

2. Prime coat on lintels shall be furnished under the Division 05 Sections.

3. Spray applied textured coating specified in Section 09 21 16.

4. Prime and finish coat for exposed exterior ferrous metal items and ferrous metal items located within Interior Pool areas shall be furnished under the "High Performance Coatings", Section 09 96 00. Refer to that Section for items included.

1.02 DEFINITIONS:

A. General: Standard coating terms defined in ASTM D16 apply to this Section.

B. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

1.03 REFERENCES

A. Code of Federal Regulations

1. 40 CFR, Part 59, Subpart D-2001: National Volatile Organic Compound Emission Standards for Architectural Coatings (EPA Method 24)

B. Green Seal, Inc. Publications:

1. GS-11 “Green Seal Environmental Standard for Paints”, First Edition 1993.

C. U.S. Green Building Council's (USGBC) Publications:

1. (LEED-NC) Version 2.2 “LEED for New Construction and Major Renovations”

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Submit manufacturer's technical information, label analysis, and application instructions for each paint material proposed for use.

2. Samples: Submit two representative samples of each major type of surface or material. Do not proceed with final painting until samples are approved.

3. Color Charts: In duplicate, for all paints, stains and special coatings. Identify with numbers used on the “Interior Finish Index” or on the Drawings.

4. Painting Schedule: In a form similar to the schedule herein outlining the type of paint to be used for each category, application, and color. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

5. Quality Control Submittals:

a. Certifications: Manufacturer's statement that paint materials conform to current regulations relating to lead content and air pollution emission requirements.

6. Submit Green Seal Certification to GS-11 and description of the basis for certification.

7. Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under work of this Section.

8. Emission Test Reports.

B. LEED Submittals:

1. Product Data for Credit EQ 4.2: For interior and exterior paints and coatings, including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For paints and coatings, documentation indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Written Permission in writing by the Owner's Representative for the use of Mechanical application methods.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

B. Coordination of Work: Review Sections in which primers are provided to ensure compatibility of the total systems for various substrates.

C. Material Quality: Provide the manufacturer's best quality trade sale type paint material of the various types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude of equal products of other manufacturers.

1.06 DELIVERY AND STORAGE

A. Deliver materials to the job site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with trade name and manufacturer's instructions.

1. Product Name or Title of Material
2. Product Description (Generic Classification or Binder Type)
3. Manufacturer's Stock Number and Date of Manufacture
4. Contents by Volume, for Pigment and Vehicle Constituents
5. Thinning Instructions
6. Application Instructions
7. Color Name and Number
8. VOC Content

B. Approved materials without the above information will NOT be allowed on the Project site.

C. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg. F. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.07 PROJECT CONDITIONS:

A. Do not apply paint in snow, rain, fog, or mist, or when the relative humidity exceeds 85 percent, or at temperatures less than 5 degrees F. above the dew point, or to damp or wet surfaces.

1.08 MATERIALS:

A. Except where noted otherwise, all finishing materials, thinners, etc., shall be the best quality, first line materials as manufactured by:

B. Avendra,LLC. Preferred Manufacturers:

1. Sherwin-Williams Co. (S-W) (800-321-8194)

C. Approved Manufacturers:

1. Benjamin Moore & Co. (BM) (888-236-6667)
2. ICI Paints (888-615-8169 Ext 2)

D. Raw linseed oil, turpentine, benzene, gloss oil, or coal oil shall not be used in any of the materials for painting work.

1.09 WASTE MANAGEMENT AND DISPOSAL

A. Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Obtain information on these controls from applicable government agencies having jurisdiction

B. All waste materials shall be separated and recycled. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility. Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner

C. Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

PART 2 PRODUCTS

2.01 PAINT MATERIALS - GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated.

1. Paint-material containers not displaying manufacturer's product identification will NOT be acceptable.

a. Interior paint: Recycled content paints and primers will not be permitted for interior application.

b. Toxicity/IEQ: Comply with applicable regulations regarding toxic and hazardous materials, and as specified. Paints and coatings must meet or exceed the VOC and chemical component limits of Green Seal requirements.

1) Interior paint: Comply with Green Seal GS-11.

2) Exterior paint: Comply with Green Seal GS-11.

C. Chemical Components of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:

	Products	VOC Content
1.	Flat Paints, Coatings and Primers:	Not more that 50 g/L.
2.	Non-Flat Paints, Coatings and Primers:	Not more than 150 g/L
3.	Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals:	Not more than 250 g/L
4.	Floor Coatings:	Not more than 250 g/L
5.	Stains:	Not more than 250 g/L
6.	Clear Wood Finishes, Varnishes and Sanding Sealers:	Not more than 350 g/L
7.	Clear Wood Finishes, Lacquers:	Not more than 550 g/L
8.	Exterior Flat Paints, Coatings and Primers:	Not more than 100 g/L
9.	Exterior Non-Flat Paints, Coatings and Primers:	Not more than 150 g/L

10. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

11. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.

b. Acrylonitrile.

c. Antimony.

d. Benzene.

e. Butyl benzyl phthalate.

f. Cadmium.

g. Di (2-ethylhexyl) phthalate.

h. Di-n-butyl phthalate.

i. Di-n-octyl phthalate.

j. 1,2-dichlorobenzene.

k. Diethyl phthalate.

l. Dimethyl phthalate.

m. Ethylbenzene.

n. Formaldehyde.

o. Hexavalent chromium.

p. Isophorone.

q. Lead.

r. Mercury.

s. Methyl ethyl ketone.

t. Methyl isobutyl ketone.

u. Methylene chloride.

v. Naphthalene.

w. Toluene (methylbenzene).

x. 1,1,1-trichloroethane.

y. Vinyl chloride.

2.02 SPAR VARNISH

A. Modified alkyd resin meeting federal regulations for lead and other heavy metals.

B. Clear, gloss finish.

C. Apply varnish on exposed ends of millwork as required in Section 12 30 00 (06400) - Architectural Woodwork and all field cuts in top and bottom rails of wood doors shall be sealed with two coats of varnish.

2.03 PROTECTIVE COATINGS

A. Bituminous Paint: Acid and alkali resistant type conforming to ASTM D1187.

B. Zinc Chromate Primer: Standard zinc chromate primer, selected from manufacturers listed in this Section.

C. Aluminum Pigmented Paint: Fibrated aluminum complying with ASTM D2824, Type IV.

D. Apply protective coating, bituminous paint, to isolate aluminum member as required.

2.04 PAINT SCHEDULE

A. Detailed specifications for the various surfaces are shown in the Paint Schedule. If these specifications conflict with the recommendations of the manufacturer, this discrepancy shall be brought to the attention of the Owner's Representative, the Owner's Representative shall decide which method shall be followed.

B. Refer to Paint Schedule at the end of this Section.

2.05 COLOR SAMPLES:

A. The Contractor shall furnish samples of all finishes in triplicate and obtain the approval of color match before starting work. Final colors must match exactly with the approved sample. Colors selection and quantity of different colors, as shown on Drawings, and approved by Owner's Representative.

B. Where a different manufacturer is utilized that product identified in Interior Finish Index, color must match listed name or number.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with requirements. Do not begin application until unsatisfactory conditions have been corrected.

1. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

3.02 SURFACES TO BE COATED

A. Paint access doors, panels, registers, diffusers, light fixture trim, metal speaker covers and grilles the same color as adjacent surfaces. Paint access doors and panels in open position.

B. Paint interiors of ducts showing through registers and grilles flat black.

C. Paint prime coated or previously painted hinges the same as door frame to which they are attached.

D. Finish edges of doors to match faces.

E. Do not paint electrical device face plates or devices, sprinkler heads, smoke alarms or thermostats/covers.

F. Unless otherwise directed, remove and spray paint metal items/products that are removable such as vents, registers, access panels, covers, louvers and diffusers. Reinstall upon completion.

3.03 SURFACE PREPARATION:

A. Clean and prepare surfaces to be painted in accordance with manufacturer's instructions for each particular substrate condition. Notify Architect in writing of problems anticipated using specified finish coat material with substrates primed by others.

B. Cementitious Surfaces: Prepare concrete, concrete masonry, cement plaster and similar surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze.

1. Determine alkalinity and moisture content of surfaces to be painted. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

2. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

3. At areas to receive epoxy paint, clean concrete with muriatic acid, wash per manufacturers recommendations.

C. Ferrous Metals: Clean non-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.

1. Touch-up shop-applied prime coats that have been damaged, and bare areas. Wire-brush, clean with solvents, and touch-up with the same primer as the shop coat.

2. At areas to receive epoxy paint, prepare steel surfaces to SSPC-SPII power tool clean.

D. Galvanized Surfaces: Utilize SSPC-SP1 solvent cleaning and chemical wash (tri-sodium phosphate). Power wash with tri-sodium phosphate type cleaner (5% solution at 140 degrees F.) and solvent clean after rinsing and drying with a non-petroleum based solvent cleaner so that surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock, by mechanical methods.

1. Touch-up shop-applied prime coats that have been damaged, and bare areas. Wire-brush clean with solvents, and touch-up with the same primer as the shop coat.

E. Wood Surfaces:

1. General:

a. Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

b. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

c. Delete subparagraphs below if these requirements are specified in other Sections.

d. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

e. When transparent finish is required, backprime with spar varnish.

f. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.

g. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

3.04 MATERIALS PREPARATION:

A. Mix and prepare paint in accordance with manufacturer's directions.

B. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain before using.

C. Use only thinners approved by manufacturer, and only within recommended limits.

3.05 APPLICATION:

A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

B. Paint colors, surface treatments, and finishes are indicated in "schedules."

C. The number of coats and film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured. Sand between applications where required to produce a smooth, even surface. Apply additional coats when undercoats or other conditions show through final coat, until paint film is of uniform finish, color, and appearance.

D. The term "exposed surfaces" includes areas visible when permanent or built-in items are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

E. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

F. Omit primer on metal surfaces that have been shop-primed, unless primer becomes worn, damaged, or more than six months old from date of delivery to job site.

G. Paint all edges of every door to match faces, including top and bottoms.

3.06 MINIMUM COATING THICKNESS:

A. Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the system as recommended by the manufacturer.

3.07 BLOCK FILLERS:

A. Apply block fillers at a rate to ensure complete coverage with pores filled.

3.08 PRIME COATS:

A. Before application of finish coats, apply a prime coat as recommended by the manufacturer to material required to be painted or finished, and has not been prime coated by others.

B. Tinting of primers will not be permitted.

C. Re-coat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat to assure a finish coat with no burn-through or other defects due to insufficient sealing.

D. Back Priming:

1. All wood trim shall be back primed before installation. Spot prime all ends of trim.

3.09 BRUSH APPLICATION:

A. Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Draw neat glass lines and color breaks. Apply primers and first coats by brush unless manufacturer's instructions permit use of mechanical applicators.

3.10 ROLLER APPLICATION

A. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

3.11 MECHANICAL APPLICATIONS:

A. Mechanical methods for paint application will ONLY be permitted by written permission of the Architect. All suite entry doors must be brush applied.

3.12 FIELD QUALITY CONTROL

A. Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

B. Where touch-ups occur, match color and sheen of existing surface. Touch-ups must blend invisibly, or painting must be extended to nearest corner or other termination point, as acceptable to the Owner's Representative.

C. Painted exterior and interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Owner's Representative:

1. Brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.

2. Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.

3. Damage due to touching before paint is sufficiently dry or any other contributory cause.

4. Damage due to application on moist surfaces or caused by inadequate protection from the weather.

5. Damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).

6. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 48".

7. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 48".

8. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.

9. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.

D. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.

2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:

a. Dry Film Thickness.

b. Volume Solids

c. Content of the material actually delivered to the site as compared to the product's published label analysis

3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying

paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.13 CLEANING

A. At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction

B. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing, scraping, or other proper methods, using care not to scratch or damage adjacent finished surfaces.

C. Protect work of other trades, whether to be painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

D. Provide "Wet Paint" signs to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations. At completion of construction activities of other trades, touch-up and restore damaged or defaced painted surfaces.

END OF SECTION

Revision Log

Note This Section 09 90 00B is comprised of two (2) sepcification sections. The first section contains the specifications, the second section contains the Paint Schedule.

PAINT SCHEDULE

DESCRIPTION				MANUFACTURER											
				SHERWIN-WILLIAMS				BENJAMIN MOORE				ICI PAINTS			
Type & Surface	Luster	Max VOC Content[2] (g/L)	No. of Coats	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)
1. Interior Ferrous Metal (Not Galvanized and Shop Primed)	Acrylic Latex Semi-Gloss	250	1	Pro Industrial Pro-Cryl Universal Primer (B66W310)	3.00	Y	<100	Acrylic Metal Primer (M04)	1.50	N	52	Devflex WB PF DTM Primer & Finish (4020)	2.20-3.50	Y	91
		150	2	ProClassic Waterborne Acrylic Semi-Gloss (B31 Series)	1.30	Y	147	Eco Spec Interior Latex Semi Gloss Enamel (224)	1.40	Y	0	Dulux Advanced Oil Semi-Gloss Wall & Trim Enamel (1506)	1.50-2.00	Y	48
2. Interior Ferrous Metal (Galvanized)	Acrylic Latex Semi-Gloss	250	1	Pro Industrial Pro-Cryl Universal Primer (B66W310)	3.00	Y	<100	Eco Spec Interior Latex Primer Sealer (231)	1.00	Y	0	Devflex WB PF DTM Primer & Finish (4020)	2.20-3.50	Y	91
		150	2	ProClassic Waterborne Acrylic Semi-Gloss (B31 Series)	1.30	Y	147	Eco Spec Interior Latex Semi Gloss Enamel (224)	1.40	Y	0	Dulux Advanced Oil Semi-Gloss Wall & Trim Enamel (1506)	1.50-2.00	Y	48
4. Interior Pipes, Ductwork, & Mechanical Equipment (Not Galvanized)	Acrylic Latex Eggshell	150	1	Pro Industrial Pro-Cryl Universal Primer (B66W310)	3.00	Y	<100	Fresh Start All-Purpose 100% Acrylic Primer (023)	1.20	N	49	Devflex WB PF DTM Primer & Finish (4020)	2.20-3.50	Y	91
		150	1	ProGreen 200 Interior Latex Eg-Shel (B20-600 Series)	1.70	Y	41	Eco Spec Interior Latex Eggshell Enamel (223)	1.40	Y	0	Dulux Pro Standard Interior Eggshell Wall and Trim Paint	1.50	Y	45
5. Interior Pipes, Ductwork, & Mechanical Equipment (Galvanized)	Acrylic Latex Eggshell	150	1	Pro Industrial Pro-Cryl Universal Primer (B66W310)	3.00	Y	<100	Eco Spec Interior Latex Primer Sealer (231)	1.00	Y	0	Devflex WB PF DTM Primer & Finish (4020)	2.20-3.50	Y	91

DESCRIPTION				MANUFACTURER											
				SHERWIN-WILLIAMS				BENJAMIN MOORE				ICI PAINTS			
Type & Surface	Luster	Max VOC Content[2] (g/L)	No. of Coats	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)
		150	1	ProGreen 200 Interior Latex Eg-Shel (B20-600 Series)	1.70	Y	41	Eco Spec Interior Latex Eggshell Enamel (223)	1.40	Y	1	Dulux Pro Standard Interior Eggshell Wall and Trim Paint	1.50	Y	45
6. Interior Gypsum Board (New)	Acrylic Latex Eggshell	150	1	ProGreen 200 Interior Latex Primer (B28W600 Series)	1.50	Y	43	Eco Spec Interior Latex Primer Sealer (231)	1.00	Y	0	Prep & Prime PVA Wall Interior Water-Based Primer (1030-1200)	1.50	Y	100
		150	2	ProGreen 200 Interior Latex Eg-Shel (B20-600 Series)	1.70	Y	41	Eco Spec Interior Latex Eggshell Enamel (223)	1.40	Y	0	Dulux Pro Standard Interior Eggshell Wall and Trim Paint	1.50	Y	45
7. Interior Gypsum Board (New)	Acrylic Latex Flat	50	1	ProGreen 200 Interior Latex Primer (B28W600 Series)	1.50	Y	43	Eco Spec Interior Latex Primer Sealer (231)	1.00	Y	0	Prep & Prime PVA Wall Interior Water-Based Primer (1030-1200)	1.50	Y	100
		50	2	ProGreen 200 Interior Latex Flat (B30-600 Series)	1.80	Y	48	Eco Spec Interior Latex Flat (219)	1.20	Y	0	Dulux Pro Standard Interior Flat Wall and Ceiling Paint (1221)	1.50	Y	50
8. Interior Gypsum Board or Plaster (New)	Acrylic Latex Eggshell	150	1	Harmony Interior Latex Primer (B11W900)	1.30	Y	0	Eco Spec Interior Latex Primer Sealer (231)	1.00	Y	0	Prep & Prime Odor-Less Interior Water-Based Primer-Sealer (LM9116)	1.30	Y	0
		150	2	Harmony Interior Latex Eg-Shel (B9 Series)	1.60	Y	0	Eco Spec Interior Latex Eggshell Enamel (223)	1.40	Y	0	Dulux Lifemaster Eggshell Interior Latex Enamel (9030)	1.60	Y	0

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				SHERWIN-WILLIAMS				BENJAMIN MOORE				ICI PAINTS			
Type & Surface	Luster	Max VOC Content[2] (g/L)	No. of Coats	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)
10a. Interior Gypsum Board or Plaster (New or Previously Painted)	Acrylic Latex Satin	150	1	ProGreen 200 Interior Latex Primer (B28W600 Series)	1.50	Y	43	Eco Spec Interior Latex Primer Sealer (231)	1.00	Y	0	Prep & Prime Interior Vapor Barrier Water-Based Primer-Sealer (1060-1200)	1.36	Y	85
		150	2	Duration Home Interior Latex Satin (A97-100 Series)	1.50	Y	37	Eco Spec Interior Latex Eggshell Enamel (223)	1.40	Y	0	Dulux Lifemaster Eggshell Interior Latex Enamel (9030)	1.60	Y	0
11a. Interior Gypsum Board or Plaster (Except at Indoor Pools and Not exposed to Water)	Acrylic Latex Eggshell	150	2					Aura Eggshell Waterborne Interior Paint (0524) *Self Priming - No Primer Required*	1.80	Y	48				
12a. Interior Gypsum Board or Plaster (Indoor Pools and Pool Equip. Rm. Doors and Frames ONLY)	Acrylic Latex Satin	150	1	ProGreen 200 Interior Latex Primer (B28W600 Series)	1.50	Y	43	Aura Satin Waterborne Interior Paint (0526) *Self Priming - No Primer Required*	1.50	Y	48				
		150	2	Pro Industrial 0 VOC Acrylic Semi-Gloss (B66-600 Series)	2.50	Y	0	Aura Satin Waterborne Interior Paint (0526)	1.50	Y	48				
13. Interior Plaster (New)	Acrylic Latex Eggshell	150	1	PrepRite ProBlock Int/Ext Latex Primer Sealer (B51W20)	1.40	Y	97					Prep & Prime Gripper Multi-Purpose Interior/Exterior Water-Based Primer Sealer (3210-1200)	1.50-2.00	Y	99

DESCRIPTION				MANUFACTURER											
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Type & Surface	Luster	Max VOC Content[2] (g/L)	No. of Coats	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)	Products	Dry Mil Thickness (Per Coat)	GS-11[1] (Y or N)	VOC[2] (g/L)
		150	2	ProGreen 200 Interior Latex Eg-Shel (B20-600 Series)	1.70	Y	41	Aura Eggshell Waterborne Interior Paint (0524) *Self Priming - No Primer Required*	1.80	Y	48	Dulux Pro Standard Interior Eggshell Wall and Trim Paint (1423)	1.50	Y	45
14. Interior Concrete Masonry Units Walls or Concrete Walls/Ceilings	Acrylic Latex Semi-Gloss	150	2	PrepRite Block Filler Int/Ext Latex (B25W25)	8.00	Y	45	Moorcraft SuperSpec Satin Fil (172)	5.00	N	31	Prep & Prime Block Filler Interior/Exterior Masonry Water-Based Primer (3010-1200)	10.00	Y	61
		150	1	ProGreen 200 Interior Latex Semi-Gloss (B31-600 Series)	1.60	Y	47	Aura Semi-Gloss Waterborne Interior Paint (0528)	1.50	Y	47	Dulux Pro Standard Interior Semi-Gloss Wall & Trim Paint (1427)	1.30	Y	49
15. Interior Concrete Masonry Units Walls or Concrete Walls/Ceilings (Except Interior Pools)	Epoxy Eggshell		1	PrepRite Block Filler Int/Ext Latex (B25W25)	8.00	Y	45	Moorcraft SuperSpec Satin Fil (172)	5.00	N	31	Prep & Prime Block Filler Interior/Exterior Masonry Water-Based Primer (3010-1200)	10.00	Y	61
			2	Water Based Catalyzed Epoxy (B70-200 Series)	2.50 - 3.00	Y	200	Aura Eggshell Waterborne Interior Paint (0524)	1.80	Y	48	Tru-Glaze-WB Waterborne Epoxy Semi-Gloss Coating (4406)	2.00-5.00	N	200
16. Interior Concrete Masonry Units Walls or Concrete Walls/Ceilings (Interior Pools ONLY)	Epoxy Satin		1	Cement-Plex 875 (B42W200 /B42V201)	13.00 - 20.00	N	>200	Moorcraft SuperSpec Satin Fil (172)	5.00	N	31	Ultra Hide Blockaid Interior/Exterior Masonry Filler (3110-1200)	8.00-25.00	Y	0

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(Note: Block Filler to flush joints in masonry)			2	Pro Industrial Hi-Bild Waterbased Catalyzed Epoxy (B71-100)	2.50 - 3.00	N	<250	Aura Satin Waterborne Interior Paint (0526)	1.50	Y	48	Tru-Glaze-WB Waterborne Epoxy Semi-Gloss Coating (4406)	2.00-5.00	N	200
17. Interior Wood	Acrylic Latex Semi-Gloss	150	1	Harmony Interior Latex Primer (B11W900)	1.30	Y	0					Prep & Prime Wall & Woodwork 100% Acrylic Interior Water-Based Primer Sealer (1020-1200)	1.50	Y	136
		150	2	ProClassic Waterborne Acrylic Semi-Gloss (B31 Series)	1.30	Y	147	Aura Semi-Gloss Waterborne Interior Paint (0528) *Self Priming - No Primer Required*	1.50	Y	47	Dulux Advanced Oil Semi-Gloss Wall & Trim Enamel (1506)	1.50-2.00	Y	48
18a. Interior Wood	Natural Finish Satin Stain	250	1	Minwax 250 VOC Stains	Nominal	Y	250					Wood Pride Professional Wood Finishes Water-Based Wood Finishing Semi-Transparent Stain (1700)	Nominal	Y	250
		350	2	Wood Classics Waterbourne Polyurethane Varnish (A68 Series)	1.00		309					Wood Pride Professional Finishes Water-Based Satin Varnish (1802)	1.00	Y	182
19. Exterior Wood	Acrylic Solid Stain	150	1	WoodScapes House Stain Exterior Acrylic Solid Color (A15 Series)	1.30	N	135	Moorwood 100% Acrylic Solid Siding Stain (N089)	Minimal	N	78	Wood Pride Professional Finishes High Build 100% Acrylic Exterior Solid Color Stain (2601)	1.30	Y	89

DESCRIPTION				MANUFACTURER											
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Note: Prime knots with oil based primer.		150	1	WoodScapes House Stain Exterior Acrylic Solid Color (A15 Series)	1.30	N	135	Moorwood 100% Acrylic Solid Siding Stain (N089)	Minimal	N	78	Wood Pride Professional Finishes High Build 100% Acrylic Exterior Solid Color Stain (2601)	1.30	Y	89
20. Exterior Wood	Spar Varnish Natural Stain		3	Minwax Helmsman Spar Varnish	1.20	N	<500	Impervo 440 Spar Varnish	1.20	N	347	Wood Pride Professional Wood Finishes Oil-Based Spar Varnish (1907)	1.00	N	444
21a. Exterior Cement Board Siding & Trim	Acrylic Latex Eggshell	150	2					Aura Waterborne Exterior Paint Low Lustre Finish (0634) *Self Priming - No Primer Required*	2.35	Y	44				
22a. Exterior Galvanized Ferrous Metal & Ductwork (Galvanized and Not Galvanized)	Acrylic Gloss Enamel	150	1	Pro Industrial 0 VOC Acrylic Semi-Gloss (B66-600 Series)	3.00	Y	0	Acrylic Metal Primer (M04) (As Required)	1.50	N	52	Devflex WB PF DTM Primer & Flat Finish (4020)	2.20-3.50	Y	91
		150	2	Pro Industrial 0 VOC Acrylic Semi-Gloss (B66-600 Series)	3.00	Y	0	Aura Waterborne Exterior Paint Semi-Gloss (0632)	1.50	Y	46	Devflex Gloss DTM Waterborne Acrylic Enamel (659S)	2.00-4.00	Y	100

Note 1. Paints, coatings and primers meet or exceed the VOC and chemical component limits of Green Seal Standard GS-11 (First Edition May 20, 1993) requirements.

Note 2. VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Clear wood finishes, floor coatings, stains, and shellacs do not exceed the VOC limits of the South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings (in effect January 1, 2004). VOC Levels shown are unthinned without colorants, actual levels may vary based on colors used.

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Special coating for exterior, indoor pool area and exposed ferrous metals.
2. Epoxy Floor Coating
3. Concrete Stain/Sealer
4. This Section includes surface preparation and the application of special coating materials to items scheduled.
    a. Surface preparation, prime and finish coats specified are in addition to shop-priming and surface treatments.
5. Paint all exposed surfaces, whether or not colors are designated, except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same color as similar adjacent materials or surfaces. If color or finish is not designated, the Owner's Representative and Architect will select from standard colors or finishes available.
6. Painting is not required on pre-finished items, operating parts, or labels.
    a. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

B. Related Sections:

1. Section 03 30 00 - Cast-in-Place Concrete
2. Section 03 54 13 - Cementitious Decks and Underlayment
3. Section 05 52 00 - Handrails and Railings
4. Section 08 11 13 - Steel Doors and Frames
5. Section 09 90 00 - Painting

1.02 DEFINITIONS:

A. "Special Coatings" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Submit manufacturer's technical information, including basic materials analysis and application instructions for each coating material specified.
    a. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.
2. Color Charts: In duplicate, for all paints, stains and special coatings. Identify with numbers used on the “Finish Index” on Drawings.

3. Ferrous Metal: Provide two 4" square samples of metal surfaces for each type of color and finish. Define by steps.

A. LEED Submittals:

1. Product Data for Credit EQ 4.2: For interior coatings, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For interior coatings, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer, unless noted otherwise. Use only thinners recommended by the manufacturer, and only within recommended limits.

B. Coordination of Work: Review sections in which other coatings are provided to ensure compatibility of the total systems for various substrates.

1. Notify the Owner’s Representative of problems anticipated using the materials specified.

C. All ferrous metal shall be inspected for conformance with these Specifications and manufacturer specifications shall be for:

1. Surface Preparation

2. Prime and Intermediate Coats

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with trade name and manufacturer's instructions.

B. Store materials not in actual use in tightly covered containers at a minimum ambient temperature of 50 degrees F. in a well-ventilated area. Maintain containers used in storage of coatings in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary precautionary measures to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing, and application of coatings.

1.06 PROJECT CONDITIONS

A. Apply coatings only when the temperature of surfaces to be coated and surrounding air temperatures are above 50 degrees F., unless otherwise permitted by manufacturer's printed instructions. High solids products require temperature range of 70-90 degrees F.

B. Do not apply coatings in snow, rain, fog, or mist, or when the relative humidity exceeds 85 percent, or at temperatures less than 5 degrees F. above the dew point, or to damp or wet surfaces, unless otherwise permitted by manufacturer's printed instructions. Allow wet surfaces to dry thoroughly and attain the temperature and conditions specified before proceeding with or continuing the coating operation.

1.07 WARRANTY

A. Provide a five-year material and labor warranty from the manufacturer and the applicator.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufactures:

1. Exterior and Interior Pool Exposed Ferrous Metals:
   a. None
2. Epoxy Coating for Concrete Floors (Interior):
   a. The Sherwin-Williams Company (800-321-8194)
3. Concrete Stain/Sealer
   a. The Sherwin-Williams Company (800-321-8194)

B. Approved Manufacturers:

1. Exterior and Interior Pool Exposed Ferrous Metals:
   a. Tnemec Company, Inc. (800-356-3041)
2. Epoxy Coating for Concrete Floors (Interior):
   a. Euclid Chemical Co, An RPM Company (800-321-7628)
   b. Selby, BASF Building Systems (800-433-9517)
   c. Dur-A-Flex, Inc. (800-253-3539)
3. Concrete Stain/Sealer
   a. "Col-R-Tone III"; Kemiko, Epmar Corporation, a Subsidiary of Quaker Chemical Corporation (562-946-8781)
   b. Approved Substitution; L. M. Scofield (800-800-9900)
4. Acrylic based textured coating (Sto Decocoat) for Interior walls (above tile) and ceiling at Pool:
   a. Sto Corp. (800-221-2397)

2.02 MATERIALS

A. Material Compatibility: Provide block fillers, primers, finish coats, and related materials that are compatible with one another and the substrates indicated under conditions of service and application as demonstrated by the manufacturer based on testing and field experience.

B. Exterior and Interior Pool and Ferrous Metals: All structural steel and metal fabrications, miscellaneous metal (including Lintels), handrails, uninsulated piping, mechanical and electrical equipment at exterior (including all component parts, but not including stainless steel or prefinished aluminum):

1. Shop Priming:
   a. SP6 Commercial Blast
   b. Primer: Tnemec Series 901K-97 Tnemec-Zinc at 3.0 mils DFT.
2. Field Application:
   a. SP3 power tool clean
   b. Spot Prime: Tnemec Series 901K-97, Tneme-Zinc.

c. Finish (required at exposed items only): Tnemec Series 113 (color) Tneme-Tufcoat 5.0 – 6.0 mils DFT. Color as selected by Owner's Representative. Apply one coat if spray applied, two coats if brush or roller applied.

C. Exterior Steel Doors and Frames (Galvanized):

1. Factory Primer (By Door Manufacturer)

a. To be sanded or abraded as recommended by Tnemec Co., Inc..

2. Tie Coat: "Clean 'n Etch" pretreatment solution by Great Lakes Laboratories (800-888-1105)

3. Back-prime frames and all edges with Tnemec Series 66 HB Epoxoline at 2.0 mils DFT.

4. Finish: One coat Tnemec Series 113 Tneme-Tufcoat (Semi-Gloss Color) at 3.0 mils DFT.

D. Decorative Epoxy Coating for Concrete Floors:

1. Prepare surface as recommended by manufacturer. Use abrasive blast cleaning method if requested.

2. Two Part Epoxy Coating: "Eucopoxy Tufcoat DBS Pigmented Resin System" by Euclid Chemical Co, An RPM Company, or "Selbatwede 41 CR" by Selby, BASF Building Systems.

a. Comply with flooring system manufacturer's recommendations for installation.

b. Provide a minimum of two coats with total dry film thickness of nominal 20 - 25 mils, as recommended by manufacturer.

c. Color as shown on Interior Finish Index.

E. Clear Sealer for Concrete Floors

1. Refer to Section 03 30 00 and Interior Finish Index.

2.03 COLOR SAMPLES:

A. The Contractor shall furnish samples of all finishes in triplicate and obtain the approval of color match before starting work. Final colors must match exactly with the approved sample. Colors selection and quantity of different colors, as shown on Drawings, and approved by Owner's Representative.

B. Where a different manufacturer is utilized that product identified in Interior Finish Index, color must match listed name or number.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with requirements. Do not begin application until unsatisfactory conditions have been corrected.

B. Start of coating work will be construed as the applicator's acceptance of surfaces within particular area.

3.02 PREPARATION:

A. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and items in place that are not to be painted, or provide protection prior to surface preparation and coating. Remove items, if necessary, for complete painting of the items and adjacent surfaces. Following completion of coating operation, reinstall items removed using workmen skilled in the trades involved.

3.03 SURFACE PREPARATION:

A. Clean and prepare surfaces to be painted in accordance with manufacturer's instructions for each particular substrate condition.

B. Ferrous Metal: Clean ungalvanized ferrous metal surfaces that have not been shop-coated. Remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with the recommendations of the Steel Structures Painting Council.

1. Blast-clean steel surfaces as recommended by the coating system manufacturer and according to the requirements of SSPC Specification SSPC-SP 10.

C. Galvanized Steel/Non Ferrous Metals: Utilize SSPC-SP1 solvent cleaning and chemical power wash (tri-sodium phosphate) to remove solvent and non-solvent soluble sealers and other substrate contaminants.

1. Touch-up shop-applied prime coats that have been damaged and bare areas. Wire-brush, solvent clean, and touch-up with the same primer as the shop coat.

D. Material Preparation: Carefully mix and prepare materials according to the coating manufacturer's directions.

1. Maintain containers used in mixing and application of coatings according to the manufacturer's directions.

2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain the coating material before using.

3.04 APPLICATION

A. General: Apply special coatings by brush, roller, spray, squeegee, or other applicators according to the manufacturer's directions. Use brushes best suited for the material being applied. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

1. Do not apply coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.

2. Provide finish coats compatible with the primers used.

B. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Where sanding is required, according to the manufacturer's directions, sand between applications to produce a smooth, even surface.

C. The term "exposed surfaces" includes areas visible when permanent or built-in. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

1. Coat surfaces behind movable equipment and furniture the same as similar exposed surfaces.

2. Coat the back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

D. Minimum Coating Thickness: Apply each material no thinner than the manufacturer's recommended spreading rate. Provide total dry film thickness (DFT) of the entire system as recommended by the manufacturer.

E. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to the material required to be coated or finished that has not been prime-coated by others.

1. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.

F. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.

1. Apply primers and first coats by brush unless the manufacturer's instructions permit using mechanical applicators.

G. Mechanical Applications: Use mechanical methods to apply coating when permitted by the manufacturer's recommendations and governing regulations, only when approved by Architect.

1. Wherever using spray application, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of two coats in one pass, unless recommended by the manufacturer.

H. All field connections such as bolts, nuts, and other fasteners shall be totally encapsulated with special coating system to match adjacent material.

3.05 FIELD QUALITY CONTROL

A. Applicator to maintain accurate records of the application and provide copies of the records to the manufacturer, if requested.

1. Minimum information required in the records:

a. Daily temperatures - morning and evening

b. Weather conditions

c. Total area applied daily

d. Amount of materials used daily

e. Computed square foot coverage rate

B. Manufacturer's written instructions will be kept at job site. Before application begins, all personnel involved will read these instructions.

3.06 COMPLETED WORK:

A. Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.07 FIELD QUALITY CONTROL:

A. The Owner reserves the right to engage the services of an independent testing laboratory to sample paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.

B. The testing laboratory will perform appropriate tests as required by the Owner.

C. If tests shown that material being used does not comply with specified requirements, the Contractor may be directed to stop painting and remove non-complying paint, pay for testing, repaint surfaces coated with rejected paint, remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

3.08 CLEAN-UP:

A. At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

B. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing, scraping, or other proper methods, using care not to scratch or damage adjacent finished surfaces.

C. Protect work of other trades, whether to be painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Owner's Representative.

D. Provide "Wet Paint" signs to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

1. At completion of construction activities of other trades, touch-up and restore damaged or defaced painted surfaces.

END OF SECTION

Revision Log

SECTION 10 11 00 - VISUAL DISPLAY SURFACES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Decorative Merchandising Slotted Display Wall.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit product data which shall include physical dimensions, operational features, color and finish, anchorage details, rough-in measurements, location, and details.

2. Submit manufacturer's installation instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. “Model No. 2000” Displawall; Marlite (330-343-6621)

2. Approved Substitution

2.02 DISPLAY WALL

A. Panel Color: As shown on Interior Finish Index.

B. Panel Groove Insert Option: Medium duty-aluminum inserts mill finish, field installed.

C. Core: Solid 48 pound medium density fiberboard substrate with internal bond strength of 110 pounds per square inch minimum.

D. Formaldehyde Emissions: 0.3 ppm or less and shall comply with HUD 24 CFR Part 3280 standards for particleboard panels.

E. Type: "T" grooves factory machined into 3/4" substrate.

F. Overall Panel Dimension: 4'x 8'-3".

G. Groove Spacings: 3" on centers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install unit and level on wall. Secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

Revision Log

SECTION 10 14 00 - SIGNAGE

Note: Coordinate interior signage with FF&E package.

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and Exterior Graphic Plaques, Characters and Accessories.
    a. Furnished and Installed by Owner:
        1) Directional Signage
        2) Identification Signage
        3) Projection Mounted Signage
        4) Stair and Elevator Signage
        5) Informational Signage
        6) Letters and Graphics
        7) Key Card Signage
        8) Porte Cochere Signage
        9) Guest Room Signage
        10) Exercise Room Signage
        11) Pool Signage
        12) Fire Pit Emergency Shutoff Signage
        13) Fire Pit Warning Plaque Signage
2. Exterior Signs:
    a. Furnished and Installed by Owner:
        1) Channel Letter Signs
        2) Single-Faced, Wall Mounted Signs
        3) Monument Signs
        4) Pylon Signs
3. Mounting Devices and Fittings.
4. Preparation of camera-ready artwork needed to produce the complete graphics package, unless otherwise noted.

B. Related Sections:

1. Sign Manual – Interior Graphics Package
2. Sign Manual – Exterior Graphics Package
3. Section 10 31 00 – Manufactured Fireplaces: For Emergency Shut Off and Warning Plaque signage installed at Fire Pit
4. Section 14 21 23 – Electric Traction Passenger Elevators: For code required elevator signage.
5. Section 26 51 00 – Interior Lighting: For Exit Lighting.

6. Division 26 Sections: For electrical service and connections for illuminated signs.

1.02 REFERENCES

A. American National Standards Institute, Inc.(ANSI) Publications:

1. A117.1 “American National Standard for Buildings and Facilities Providing Accessibility and Usability for Physically Handicapped People”

B. Americans with Disabilities Act Accessibility Guidelines (ADAAG)

C. ASTM International (ASTM) Publications:

1. B117 “Standard Practice for Operating Salt Spray (Fog) Apparatus”

2. D1735 “Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus”

D. American Welding Society (AWS)

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide monument and pylon signs capable of withstanding the effects of gravity loads and the loads and stresses within limits and under conditions as required for Project location.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. A copy of the manufacturer's printed installation manual shall accompany Bid for review and approval by the Owner's Representative.

2. Shop Drawings showing sign layout, lettering style, materials, and other pertinent information.

a. Post and panel/pylon signage: Include plans, elevations, sections, details, and attachments to other work.

b. Show locations of electrical service connections.

1.05 QUALITY ASSURANCE

A. Graphic signs, including materials, fabrication, mounting and installation, shall conform to state and local code regulations and requirements.

B. All items shall utilize the highest standards of professional workmanship and practices.

1.06 DELIVERY, STORAGE AND HANDLING

A. Coordinate delivery of materials comprising the complete graphics package. Store materials upon approval of Owner. Take precautions to protect materials and be responsible for same until installed, inspected and accepted in writing by Owner.

1.07 PROJECT CONDITIONS

A. Coordinate work with all trades affected by Contractor's work and be fully cognizant of their requirements as pertaining to Contractor's work.

1.08 WARRANTIES

A. Special Warranty: All materials, finishes and workmanship shall be warranted for a period of two (2) years after final acceptance of the work. If during the warranty period, any defects or faulty materials are found, the Contractor shall immediately proceed at his own expense to replace and/or repair same at not cost to Owner.

PART 2 PRODUCTS

2.01 INTERIOR SIGNAGE MANUFACTURER/FABRICATOR

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Graphic Systems; (316-267-4171)

a. Contact: Jackie Diffenbaugh

2. Forms + Surfaces (aka Cornelius Graphics) (800-553-7722)

a. Contact: Chris Gacci

3. Approved Substitution by Marriott International

2.02 MATERIALS – INTERIOR SIGNAGE

A. Basis of Design: Refer to “Sign Manual – Interior Graphics Package” for sign types, designs, and graphic information.

B. Acrylic: Produced by Rohm and Haas or approved substitution. Acrylic shall be cut straight and true, free of saw marks, burrs, scratches or other imperfections.

C. Vinyl: Pressure sensitive adhesive backed vinyl with integral color as manufactured by one of the following:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. 3M (888-364-3577)

b. Approved substitution

D. Polycarbonate Sheet: Manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating.

E. Finishes:

1. Signs: Produced by photographic silk-screen stencils unless otherwise noted. Hand-cut, frisketed, or die-cut images will not be accepted.

2. Silk-screening inks: As manufactured by one of the following:

a. Avendra, LLC Preferred Manufacturers:

1) None

b. Approved Manufacturers:

1) Naz-Dar Company (800-767-9942)

2) Approved substitution

3. Ink and paint: Mixed in sufficient quantities to assure consistent coloration throughout project.

F. Adhesive: Colorless adhesive used in strict accordance with manufacturer's recommendations for conformance to the manufacturer's product warranty, as manufactured by one of the following:

a. Avendra, LLC Preferred Manufacturers:

1) None

b. Approved Manufacturers:

1) General Electric

2) Dow Corning, Inc. (800-248-2481)

3) Approved substitution

G. Fasteners: Non-corrosive, physically compatible with material fastened. Size, shape and type as recommended by the fabricator. Owner maintains the right to review fastening techniques to assure aesthetic conformance to design drawings.

2.03 EXTERIOR BUILDING, MONUMENT AND PYLON SIGNS MANUFACTURER/FABRICATOR

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Chandler Signs (214-902-2000)
   a. Dallas, TX
   b. Contact: Bill Teel or Sara Sproull
2. Persona Inc. (800-843-9888)
   a. Watertown, SD
   b. Contact: Melissa Nash or Mike Peterson
3. Visual Products Corp. dba Transworld Signs (888-808-8030)
   a. US or Canadian Sales Contact: Scott Gabrisch (281-812-4978)
4. Coast Sign Inc. (714-520-9144)
   a. Anaheim, CA
   b. Contact: Steve Frazier
5. Philadelphia Sign Co. (856-829-1460)
   a. Palmyra, NJ
   b. Contact: George Braker
6. Cummings Signs (800-239-2655)
   a. Dothan, AL
   b. Contact: Lewis King
7. Pattison Sign Group (800-268-6536 x 2651)
   a. Toronto, Ontario
   b. Contact: John Jeppesen

2.04 MATERIALS – EXTERIOR SIGNAGE

A. Basis of Design: Refer to “Sign Manual – Exterior Graphics Package” for sign types, designs, and graphic information.

B. Standard approved signage. Coordinate mounting with building construction and site layout.

PART 3 EXECUTION

3.01 PREPARATION

A. Examination:

1. Examine areas for conditions detrimental to completion of the delivery and installation work. Report findings to the Owner's Representative immediately. Do not proceed with work until unsatisfactory conditions have been corrected or until advised in writing by the Owner.

2. Starting work constitutes acceptance of conditions under which the work is to be performed. After such acceptance Contractor shall, at his own expense, be responsible for correcting all unsatisfactory and defective work resulting from such unsatisfactory conditions.

3.02 INSTALLATION

A. Perform all cutting and fitting necessary for installation and completion of the work while accommodating the work of other trades. Immediately repair damage to existing surfaces or finishes caused by work of this Contractor at no cost to Owner.

B. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions

C. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

D. Interior Signage:

1. Install at locations as directed by Owner's Representative..

2. Install in strict accordance to manufacturer's recommended procedures.

3. Signs indicated to be door mounted shall use a combination of vinyl tape and silastic adhesive for a permanent bond.

4. Signs indicated to be installed on the wall adjacent to the latch side of the door shall have a mounting height of 60" above finished floor to centerline of sign. Mounting location shall be so that a person may approach within 3" of signage without encountering protruding objects or standing within the swing of a door.

5. Insure level installation.

E. Exterior Signage:

1. Install exterior signage and cabinet as indicated on Drawings.

3.03 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

B. Provide cleanup and removal of debris resulting from the installation work.

END OF SECTION

Revision Log

SECTION 10 26 00 - WALL AND DOOR PROTECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wall Protection Corner Guards

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Provide manufacturer's technical data, installation instructions, setting drawings, templates, instructions, and directions for installation of anchorage devices in other work.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver guards to site until rooms in which they are to be installed are ready to receive them.

B. Store packages to prevent physical damage or wetting.

C. Pack all parts individually in a manner to protect finish.

D. Maintain protective covers on all units until final clean-up.

1.04 WARRANTY

A. Work of this Section shall be jointly warrantied by the manufacturer and the installer for a period of one year after final payment. Any material or workmanship that is judged defective during this period shall be replaced at no cost to the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. IPC Door and Wall Protection Systems, Inpro Corp. (800-543-1729)

B. Approved Manufacturers:

1. Grand Entrance, A Division of Construction Specialties, Inc. (888-424-6287)
2. Balco, Inc. (800-628-0449)
3. Korogard Wall Protection Systems, a Division of RJF International Corporation (800-628-0449)

2.02 WALL PROTECTION CORNER GUARDS

A. Surface mounted corner guards of various materials. Provide backing in walls for mounting.

B. Corner Guards: “Rigid extruded PVC, 90 degree type”; adhesive applied.

1. Size:

a. Guest Rooms: ¾” x ¾”. Thickness: 0.080”

b. Corridors: 1-1/2” x 1-1/2”. Thickness: 0.080”.

c. Height to be from top of resilient or carpet base to underside of ceiling with no gaps top or bottom.

1) Where ceiling heights are greater than 8'-0", provide corner guards in one piece, no joints or seams will be permitted.

2. Color: Refer to Interior Finish Index.

3. Self-Adhesive tape application not permitted.

C. Stainless Steel Corner Guards “Model No. 180”, 90 degree type with 1/8” radius, adhesive applied, by IPC or approved substitution by listed manufacturer.

1. Locations: Laundry and Housekeeping and as shown on drawings and Interior Finish Index.

2. Size: 3-1/2” x 3-1/2”

a. Height to be from top of base to underside of ceiling.

3. Finish: No. 4, brushed finish

4. Attachment: Adhesive cement as recommended by manufacturer..

2.03 ACCESSORIES

A. Provide all appropriate mounting systems including all screws, bolts, brackets, end caps, and base plates as required for complete installation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Attach retainers to wall with appropriate anchorage devices furnished by manufacturer. Snap-lock covers onto retainers after paint or wallcoverings have been applied.

B. Install guards, accessories, and items in accordance with manufacturer's printed instructions.

C. Use concealed fastenings wherever possible.

D. Install true, plumb, and level, securely and rigidly anchored to substrate in accordance with manufacturer's instructions for each item and each type of substrate construction.

1. Attach with manufacturer’s recommended adhesive.

END OF SECTION

Revision Log

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

Note: This Section is comprised of two (2) specification sections. The second section contains the Accessory Matrix.

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Toilet Accessories
2. Bath Accessories
3. Frameless Shower Door With Fixed Glass Panel
4. Attachment hardware

B. Related Sections:

1. Section 05 50 00 - Metal Fabrications
2. Section 06 10 00 - Rough Carpentry: Blocking
3. Section 08 80 00 - Glazing: Unframed mirrors, tub and shower glass
4. Section 09 30 00 - Tiling: Coordinate installation of accessories
5. Section 10 21 13 - Toilet Compartments: Coordinate installation of accessories

1.02 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this project.

1.03 REFERENCE STANDARDS

A. ASTM A167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM A366 - Cold Rolled Carbon Steel Sheets, Commercial Quality.

1.04 QUALITY ASSURANCE:

A. Provide products of the same manufacturer for each type of accessory unit and for units exposed in the same area.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver accessories to site until rooms in which they are to be installed are ready to receive them.

B. Store packages to prevent physical damage or wetting.

C. Pack accessories individually in a manner to protect accessory and its finish.

D. Maintain protective covers on all units until final clean-up.

E. Protection: Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this Section.

1.06 WARRANTY

A. Work of this Section shall be jointly warrantied by the manufacturer and the installer for a period of one year after final payment. Any material or workmanship that is judged defective during this period shall be replaced at no cost to the Owner.

PART 2 PRODUCTS

2.01 DISTRIBUTORS

A. Avendra, LLC Preferred Distributor:

1. Contract Hardware, Inc. (800-266-3418)
    a. Contact: Mark Tew
2. Home Depot Supply
    a. Contact: Rajan Batra (703-404-4567)

2.02 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Franklin Brass, Liberty Hardware Manufacturing Corp., A Masco Company (800-421-3375)
2. WingIts LLC (877-894-6448)

B. Approved Manufacturers:

1. Bobrick Washroom Equipment, Inc. (818-503-1630)
2. Hafele America Co. (HEWI) (336-889-2322)
3. American Specialties, Inc. (ASI) (914-476-9000)
4. Gamco, A Bobrick Company (800-421-3375)
5. Continental Group (614-419-3524)
6. C.R. Laurence Company (CRL) (800-421-6144)
7. Delta Faucet Company (800-345-3358)
8. Kohler Co. (800-456-4537)
9. Mincey Marble Manufacturing Co. (800-533-1806)
10. SMEDBO Inc. (847-615-0000)

2.03 MATERIALS - TOILET ACCESSORIES

A. 18-8 (Type 302) stainless steel alloy of at least 22 gauge in all elements of cabinet work. Unless shown otherwise, all exposed stainless steel to have a #4 Satin finish or Satin chrome finish where applicable with all elements of a unit to have brushing in one direction.

B. Exposed surfaces to be protected with a factory applied PVC film to be left in place until final clean-up.

C. Mirrors to be 1/4" polished plate glass with 10-year guarantee against silver spoilage.

D. Stainless steel tubing: 18 ga., Type 304, seamless welded.

E. Fasteners, screws, and bolts: Hot dip galvanized. Expansion shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component substrate.

F. Adhesive: Epoxy type contact cement.

2.04 FRAMELESS SHOWER DOOR WITH FIXED GLASS PANEL (177)

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. C.R. Laurence Company (CRL) (800-421-6144)
2. “Model BB81770”; Continental Group (614-419-3524)

C. Glass Doors and Fixed Panels (A):

1. C.R. Laurence Company: 3/8” thick clear tempered, polished edges. Glass furnished by others. Refer Section 08 80 00 – Glazing
2. 5/16” thick clear tempered, polished edges. “Model BB817700 Doorglass / BB817700 Glassside“; Continental Group

D. U Channels for Fixed Panels (B): ¾” deep ‘U’ channel.

1. Finish: Polished Chrome (Bright Anodized)
2. “Model Number SDCD38BA”; C.R. Laurence Company
3. “Model BH817703“; Continental Group

E. Hinges (C): Glass to Wall 90° inward and outward: Self-centering with reversible 5° pivot pin. Adjustable for glass thickness from 3/8” to 1/2".

1. Finish: Polished Chrome
2. “Geneva Series Model Number GEN337CH”; C.R. Laurence Company
3. “Model BH808500“; Continental Group

F. Back to Back Pull Handles (D): Tubular brass pull handle, ¾” diameter, 1.5 mil thick, standard plastic washers included to protect against glass-to-metal contact.

1. Pull Handles: 6-1/4” center-to-center hole spacing.
2. Finish: Polished Chrome
3. “Model Number BM6X6CH ”; C.R. Laurence Company
4. “Model BH817705“; Continental Group

G. Door Wipe and Drip Rail (E): Clear co-extruded polycarbonate bottom wipe with 45° drip rail to shed water back into shower. Dual wipes on bottom to create water tight seal. Wipe to snap onto bottom of door.

1. “Model Number P99WS”; C.R. Laurence Company
2. “Model 42831902“; Continental Group

H. Polycarbonate Strike (F): Clear polycarbonate “h” jamb:

1. “Model Number P380HJ”; C.R. Laurence Company
2. “Model 42831902“; Continental Group

I. Door Pull Bumper (G): ¾” diameter, ¼” thick clear vinyl shower door pull bumper. Provide with 1-1/2” screw to secure to blocking.

1. “Model Number M6119”; C.R. Laurence Company

J. Polycarbonate or Vinyl Seals: Provide clear polycarbonate or vinyl seals for glass to glass edges, and glass to wall edges per manufacturer’s recommendations.

K. Fasteners: All fasteners to be by the manufacturer.

L. Adhesive Tape: Translucent, acrylic as per manufacturer's recommendations.

M. Sealant: Silicone type as per manufacturer's recommendations

2.05 FINISHES

A. Guest Rooms: Refer to Toilet & Bath Accessory Matrix for Finishes. Grab bars shall have peened gripping surface with bright polished ends.

B. Employee and Public Toilet Rooms: Refer to Toilet & Bath Accessory Matrix for Finishes. Grab Bars shall have peened gripping surface with satin finish ends.

C. Exposed heads of fasteners shall match finish of accessory.

2.06 FABRICATION - TOILET ACCESSORIES

A. Provide steel anchor plates and anchor components for installation on building finishes.

B. Form surfaces flat without distortion. Maintain flat surface without scratches or dents.

C. Back paint components where contact is made with building finishes to prevent electrolysis.

D. Hot dip galvanize ferrous metal anchors and fastening devices.

E. Shop assemble components and package complete with anchors and fittings.

PART 3 EXECUTION

3.01 PREPARATION

A. Deliver inserts and rough-in frames to job site and in appropriate time for building-in. Provide templates and rough-in measurements as required.

B. Before starting work, notify Owner's Representative in writing of any conflicts detrimental to installation or operation of units.

C. Verify with Owner's Representative exact location of accessories.

3.02 INSTALLATION

A. Install fixtures, accessories, and items in accordance with manufacturer's printed instructions.

B. Use concealed fastenings wherever possible.

C. Install true, plumb, and level, securely and rigidly anchored to substrate in accordance with manufacturer's instructions for each item and each type of substrate construction.

1. Wood blocking shall be provided at grab bars and fold down shower seats, and as shown on Drawings.

2. Strap metal may be used for all other areas, as approved by Owner's Representative, unless indicated otherwise.

D. Fasteners for all accessory mounting to be theft-resistant.

PART 4 ACCESSORY SCHEDULE

Note: Refer to Toilet & Bath Accessory Matrix following this section

END OF SECTION

Revision Log

Universal Location Mark	Description	Finish	Manufacturer	Model No.	Gen / Decor Scheme		Area
115	Toilet Tissue Holder - Double (Heavy Duty)	US32D	American Specialties, Inc.	AS 7305-28	Gen 4 A.I.R.		Public Restroom
		US32D	Bobrick Washroom Equipment, Inc	B-6867	Gen 4 A.I.R.		Public Restroom
	Toilet Tissue Holder –Double (Heavy Duty)	US32D	Franklin Brass, a Liberty Hardware	FB 5507BSF	Gen 4 A.I.R.		Public Restroom
149	Robe Hook – Single	US26	Delta Faucet Company	Grail Series 771325	Gen 4 A.I.R.		Public Restroom
325	Soap Dispenser (Lavatory-Mtd., Top Load, 6" Spout, 34 oz)	US32D	American Specialties, Inc.	AS 0332D	Gen 4 A.I.R.		Public Restroom
		US32D	Bobrick Washroom Equipment, Inc	B-8226	Gen 4 A.I.R		Public Restroom
333	Seat Cover Dispenser (Wall Mtd)	US32D	Bobrick Washroom Equipment, Inc	B-4221	Gen 4 A.I.R		Public Restroom
152	Grab Bar 18" (Peened Gripping Surface)	US32D	American Specialties, Inc.	AS 3701-18-P	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	Bobrick Washroom Equipment, Inc	B-5806.99 x 18"	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	Franklin Brass, a Liberty Hardware Brand, A Masco Company	5618PS	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	WingIt Innovations	WGB5SSPE18	Gen 4 A.I.R.	Public	Restroom (ADA Stall)

Finish Codes: US26 = Chrome, Bright; US26D = Chrome, Satin; US32 = Stainless Steel, Bright (Polished); US32D = Stainless Steel, Satin (CPG Equivalent); US15 = Satin Nickel; CPG = Champagne; WHT =White

Note 1: Not Used
Note 2: Not Used

Universal Location Mark	Description	Finish	Manufacturer	Model No.	Gen / Decor Scheme		Area
158	Grab Bar 36" (Peened Gripping Surface)	US32D	American Specialties, Inc.	AS 3701-36-P	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	Bobrick Washroom Equipment, Inc	B-5806.99 x 36"	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	Franklin Brass, a Liberty Hardware Brand, A Masco Company	5636PS	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	WingIt Innovations	WGB5SSPE36	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
160	Grab Bar 42" (Peened Gripping Surface)	US32D	American Specialties, Inc.	AS 3701-42-P	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	Bobrick Washroom Equipment, Inc	B-5806.99 x 42"	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	Franklin Brass, a Liberty Hardware Brand, A Masco Company	5642PS	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
		US32D	WingIt Innovations	WGB5SSPE42	Gen 4 A.I.R.	Public	Restroom (ADA Stall)
149	Robe Hook – Single	US26	Delta Faucet Company	Grail Series 771325	Gen 4 A.I.R.	Guestroom	Bath
185	Towel Bar 24”	US32	Delta Faucet Company	77124	Gen 4 A.I.R.	Guestroom	Bath

Finish Codes: US26 = Chrome, Bright; US26D = Chrome, Satin; US32 = Stainless Steel, Bright (Polished); US32D = Stainless Steel, Satin (CPG Equivalent); US15 = Satin Nickel; CPG = Champagne; WHT =White

Note 1: Not Used
Note 2: Not Used

Universal Location Mark	Description	Finish	Manufacturer	Model No.	Gen / Decor Scheme		Area
177	Glass Shower Door w/Fixed Panel including:	US26	See Section 10 80 00 for Manuf/ (A) Glass Fixed Panel (B) U-Channels (C) Hinges (D) Pull Handle with 18" Towel Bar (E) Door Wipe/Drip Rail (F) Polycarbonate Strike (G) Door Pull Wall Bumper		Gen 4 A.I.R. Components	Guestroom	Bath - Shower
179	Soap Dish/Shower Caddy (Corner Surface Mount)	US26	Mincy Marble Manufacturing	SD-08	Gen 4 A.I.R.	Guestroom	Bath – Shower
		US26	SMEDBO	HK377	Gen 4 A.I.R.	Guestroom	Bath – Shower
154	Grab Bar 24"	US32	American Specialties, Inc.	AS 3701-24	Gen 4 A.I.R.	Guestroom	Bath
		US32	Bobrick Washroom Equipment, Inc	B-5806.99 x 24"	Gen 4 A.I.R.	Guestroom	Bath
		US32	Franklin Brass, by Bath Unlimited, A Masco Company	5624	Gen 4 A.I.R.	Guestroom	Bath
		US32	WingIt Innovations	WGB5SSXX24	Gen4 A.I.R.	Guestroom	Bath

Finish Codes: US26 = Chrome, Bright
US26D = Chrome, Satin
US32 = Stainless Steel, Bright (Polished)
US32D = Stainless Steel, Satin (CPG Equivalent)
US15 = Satin Nickel
CPG = Champagne
WHT =White

Note 1: Not Used
Note 2: Not Used

Universal Location Mark	Description	Finish	Manufacturer	Model No.	Gen / Decor Scheme		Area
170	Shower Curtain Rod - Curved (6" Bow)	US32	WingIt Innovations	WER555-6	Gen 4 A.I.R.	Guestroom	Bath – Tub
	Field Cut at shorter tub *Note						
	(A) New Build: Use BAWFA Face Plate	US32	Franklin Brass, by Bath Unlimited, A Masco Company	FB190-5PC	Gen 4 A.I.R.	Guestroom	Bath - Tub
179	Soap Dish/Shower Caddy (Corner Surface Mount)	US26	Mincy Marble Manufacturing	SD-08	Gen 4 A.I.R.	Guestroom	Bath – Tub
		US26	Smedbo	HK377	Gen 4 A.I.R.	Guestroom	Bath - Tub
132	Mirror (Frameless)		N/A	(See Section 08 80	Gen 4 A.I.R.	Guestroom	Bath – Vanity 00 (08800)
134	Mirror – Framed (2 Each Per Room)		FBO/IBC		Gen 4 A.I.R.	Guestroom	Bath – Vanity
187	Towel Bar 12” (cut to length in field)	US26	Delta Faucet Company	77118	Gen 4 A.I.R.	Guestroom	Toilet
118	Toilet Tissue Holder (Surface Mount)	US26	Delta Faucet Company	Grail Series 77150 (Not Available in Double Roll, install 2 side by side)	Gen 4 A.I.R.	Guestroom	Toilet-Water Closet
149	Robe Hook - Single	US26	Delta Faucet Company	Grail Series 771325	Gen 4 A.I.R.	Guestroom	Bath - ADA
185	Towel Bar 24”	US32	Delta Faucet Company	77124	Gen 4 A.I.R.	Guestroom	Bath - ADA

Finish Codes: US26 = Chrome, Bright US32 = Stainless Steel, Bright (Polished) US15 = Satin Nickel WHT =White
US26D = Chrome, Satin US32D = Stainless Steel, Satin CPG = Champagne
(CPG Equivalent)

Note 1: Not Used
Note 2: Not Used

Universal Location Mark	Description	Finish	Manufacturer	Model No.	Gen / Decor Scheme		Area
151	Grab Bar 12” (with peened non-slip	US32	American Specialties, Inc.	AS3701-P-12(18)	Gen 3 Elements		Bathroom - ADA
		US32	WingIt Innovations	WGB5PU12WH	Gen 3 Elements	Guestroom	Bathroom - ADA
152W	Grab Bar 18” (with peened non-slip	US32	Bobrick Washroom Equipment, Inc.	B5806.99 x 12 (18)	Gen 3 Elements	Guestroom	Bathroom – ADA
		US32	Franklin Brass, by Bath Unlimited, A Masco Company	FB5712PSBS (18)	Gen 3 Elements	Guestroom	Bathroom – ADA
		US32	WingIt Innovations	WGB5AS18SS	Gen 3 Elements	Guestroom	Bathroom – ADA
153	Grab Bar 16" (with peened non slip grip surface)	US32	American Specialties, Inc.	AS3701P-16	Gen 3 Elements	Guestroom	Bathroom - ADA
		US32	Bobrick Washroom Equipment, Inc.	B-5806.99 x 16”	Gen 3 Elements	Guestroom	Bathroom - ADA
		US32	Franklin Brass, by Bath Unlimited, A Masco Company	FB5716PSS	Gen 3 Elements	Guestroom	Bathroom - ADA
		US 32	WingIt Innovations	WGB5AS-SS16	Gen 3 Elements	Guestroom	Bathroom – ADA
155	Grab Bar 24" (with peened non slip grip surface)	US32	American Specialties, Inc.	AS3701P-24	Gen 3 Elements	Guestroom	Bathroom - ADA
		US32	Bobrick Washroom Equipment, Inc.	B-5806.99 x 24”	Gen 3 Elements	Guestroom	Bathroom - ADA
		US32	Franklin Brass, by Bath Unlimited, A Masco Company	FB5724PSS	Gen 3 Elements	Guestroom	Bathroom - ADA
		US32	WingIt Innovations	WGB5AS-SS24	Gen 4 A.I.R.	Guestroom	Bath - ADA

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Note 1: Not Used
Note 2: Not Used

Universal Location Mark	Description	Finish	Manufacturer	Model No.	Gen / Decor Scheme	Area
155S	Slide Bar w/Hand Held Showerhead (At Shower)	US26	Speakman Company	VS-1001-ADA-PC	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
166	Grab Bar 30" (with peened non-slip grip surface)	US32	American Specialties, Inc.	AS3701-P-30	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 30" (with peened non-slip grip surface)	US32	Bobrick Washroom Equipment, Inc.	B-5806.99x30	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 30" (with peened non-slip grip surface)	US32	Franklin Brass, by Bath Unlimited, A Masco Co.	FB5730PSBS	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 30" (with peened non-slip grip surface)	US32	Wingit Innovations	WGB5-AS-SS-30	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 36" (with peened non-slip grip surface)	US32	American Specialties, Inc.	AS3701-P-36	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 36" (with peened non-slip grip surface)	US32	Bobrick Washroom Equipment, Inc.	B-5806.99x36	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 36" (with peened non-slip grip surface)	US32	Franklin Brass, by Bath Unlimited, A Masco Co.	FB5736PSBS	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 36" (with peened non-slip grip surface)	US32	Wingit Innovations	WGB5-AS-SS-36	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 18" (with peened non-slip grip surface) (Vertical)	US32	American Specialties, Inc.	AS3701-P-18	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 18" (with peened non-slip grip surface) (Vertical)	US32	Bobrick Washroom Equipment, Inc.	B-5806.99x18	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
	Grab Bar 18" (with peened non-slip grip surface) (Vertical)	US32	Franklin Brass, by Bath Unlimited, A Masco Co.	FB5718PSBS	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower

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US26D = Chrome, Satin
US32 = Stainless Steel, Bright (Polished)
US32D = Stainless Steel, Satin
(CPG Equivalent)
US15 = Satin Nickel
CPG = Champagne
WHT =White

Note 1: Not Used
Note 2: Not Used

Universal Location Mark	Description	Finish	Manufacturer	Model No.	Gen / Decor Scheme	Area
	Grab Bar 18" (with peened non-slip grip surface) (Vertical)	US32	Wingit Innovations	WGB5-AS-SS-18	Gen 3 Elements Guestroom	Bathroom - ADA Roll-In Shower
159	Grab Bar 36" (At Toilet Rear Wall Horizontal)	US32	American Specialties, Inc.	AS3701P-36	Gen 3 Elements Guestroom	Bathroom - ADA
		US32	Bobrick Washroom Equipment, Inc.	B-5806.99 x 36"	Gen 3 Elements Guestroom	Bathroom - ADA
		US32	Franklin Brass, by Bath Unlimited, A Masco Company	FB5736P-SBS	Gen 3 Elements Guestroom	Bathroom - ADA
		US32	WingIt Innovations	SGB5-AS-SS36	Gen 3 Elements Guestroom	Bathroom - ADA
161	Grab Bar 42"(At Toilet Sidewall Horizontal)	US32	American Specialties, Inc.	AS 3701P-42	Gen 3 Elements Guestroom	Bathroom - ADA
		US32	Bobrick Washroom Equipment, Inc	B-5806.99 x 42"	Gen 3 Elements Guestroom	Bathroom - ADA
		US32	Franklin Brass, by Bath Unlimited, A Masco Company	FB 5742P	Gen 3 Elements Guestroom	Bathroom -ADA
152W	Grab Bar 18" (At Toilet Sidewalk Vertical)	US32	American Specialties, Inc.	AS 3701P-18	Gen 3 Elements Guestroom	Bathroom - ADA
		US32	Bobrick Washroom Equipment, Inc	B-5806.99 x 18"	Gen 3 Elements Guestroom	Bathroom - ADA
		US32	Franklin Brass, by Bath Unlimited, A Masco Company	FB 5718-PSSP	Gen 3 Elements Guestroom	Bathroom- ADA
170	Shower Curtain Rod - Curved (6" Bow)	US26	Franklin Brass, by Bath Unlimited, A Masco Company	FB 190-5PC	Gen 3 Elements Guestroom	Bathroom - ADA
		US32	WingIt Innovations	WCRSS5-6	Gen 3 Elements Guestroom	Bathroom - ADA

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Note 1: Not Used
Note 2: Not Used

Universal Location Mark	Description	Finish	Manufacturer	Model No.	Gen / Decor Scheme		Area
171	Shower Curtain Rod - Straight	US32	Franklin Brass, by Bath Unlimited, A Masco Company	FB 162-5’	Gen 3 Elements	Guestroom	Bathroom - ADA Roll-In Shower
		US32	WingIt Innovations	WSR4SS60	Gen 3 Elements	Guestroom	Bathroom - ADA Roll-in Shower
180	Toiletry Basket – 8” Wire Corner Unit	US26	Smedbo	SME-20458	Gen 3 Elements	Guestroom	Bathroom - ADA
181	Tub Seat – Nylon Coated	WHT	Hafele America Co.	HEWI 988.77.299.M	Gen 4 A.I.R.	Guestroom	Bath - ADA Tub
		WHT	WingIt Innovations	PUTB30WH	Gen 4 A.I.R.	Guestroom	Bath – ADA Tub
182	Shower Seat – Nylon Coated	WHT	Hafele America Co.	HEWI 988.77. [699 OR 799]. M [L=799 or R=699] (Use Wall Protection Base 988.78.799.M if required)	Gen 4 A.I.R.	Guestroom	Bathroom - ADA Roll-In Shower
		WHT	WingIt Innovations	PUEXSSxxWH (xx= LH / RH)	Gen 4 A.I.R.	Guestroom	Bathroom - ADA Roll-In Shower
183	Folding Edge Water Retainer & Threshold	ALUM	Shower Solutions USA, Inc.	Shower Water Dam	Gen 4 A.I.R..	Guestroom	Bath – ADA Roll-in Shower
131	Mirror (Frameless)		N/A	(See Section 08 80 00 (08800)	Gen 4 A.I.R.	Guestroom	Toilet – ADA
149	Robe Hook - Single	US26	Delta Faucet Company	Grail Series 771325	Gen 4 A.I.R.	Guestroom	Toilet – ADA
187	Towel Bar 12” (cut to length in field)	US26	Delta Faucet Company	77118	Gen 4 A.I.R.	Guestroom	Toilet - ADA

Finish Codes: US26 = Chrome, Bright US32 = Stainless Steel, Bright (Polished) US15 = Satin Nickel WHT =White
US26D = Chrome, Satin US32D = Stainless Steel, Satin CPG = Champagne
(CPG Equivalent)

Note 1: Not Used
Note 2: Not Used

SECTION 10 31 00 - MANUFACTURED FIREPLACES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fire Pit Insert
2. All Required Accessories

B. Related Sections:

1. Section 10 14 00 – Signage: for Fire Pit Emergency Shut Off and Warning Plaque signage.
2. Division 23 Sections:
    a. Gas pipe to fire pit and connection to fire pit burner.
3. Division 26 Sections: Wall switch connected to gas log electronic ignition.

1.02 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Submit product data, mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this project.
2. Shop Drawings and Samples: Submit copies of Shop Drawings of all items specified herein to Architect for approval. Obtain approval of drawings prior to proceeding with manufacturing. Shop Drawings shall indicate: elevations; details; location in the building of each item; conditions at openings with various wall thicknesses and materials; typical and special details of construction; methods of assembling sections; locations and installations requirements for hardware; size, shape, and thickness of materials; and joints and connections.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Firm with not less than 5 years of experience in installation of fireplace units of type, quantity, and installation methods similar to work of this Section.

B. All materials shall be installed in accordance with the manufacturer's printed directions.

C. Comply with the fire-resistance ratings as indicated and as required by governing authority and codes. Provide materials, accessories, and application procedures which have been listed by UL.

D. Verify that components and proposed installation comply with local and state requirements for both gas and wood burning fireplaces.

E. U.L. Listing: Flue and Throat shall be UL rated insulated type for zero clearance installation to combustible surfaces.

1.04 DELIVERY, STORAGE, AND HANDLING

A. All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements. Damaged or deteriorated materials shall be removed from the premises.

PART 2 PRODUCTS

2.01 FIRE PIT INSERT

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "3'-6" x 6'-0" (interior burner area dimensions) Stone Fire Pit Kit with Electronic Ignition";

a. Colorado Hearth & Home (800-979-3267)

b. Gas Products Company (800-476-4790)

C. Gas Fire Pit Kit:

1. Provide Fire Pit Kit complete with stainless steel bowl burner and electronic ignition control in location shown on Drawings. Stone veneered blocks and interlocking cap to be included.

a. Stone color: For Bidding purposes provide "Cultured Stone", Pro-Fit Ledgestone "Platinum" (PF-8017). Final selection by Architect.

D. Accessories/Components:

1. Lava Rock

2. Emergency Flame Shut-Off Switch: Weatherproof maintained contact red mushroom head pushbutton switch with cover labeled "EMERGENCY SHUTOFF," suitable for wiring in series in low-voltage gas control circuit.

a. Cutler-Hammer Div. Eaton Industries, HT800 Series two-position maintained push-pull button, Catalog HT8CBRB, mounted in recessed weathertight enclosure.

b. Refer to Section 10 14 00 "Signage (Interior Signage Manual)" for sign adjacent to Emergency Shutoff Switch.

3. Custom fabricated stainless steel supports around edge of pan.

4. Custom fabricated stainless steel collar surrounding entire pan system. Refer to Drawings for size and location.

5. All other components required for complete installation.

6. Warning Plaques: Warning plaques, located on top of stone at quarter points, with text as follows oriented to be read from adjoining walking surfaces:

a. "NOTICE: DO NOT LEAVE CHILDREN UNATTENDED."

b. Refer to Section 10 14 00 "Signage (Interior Signage Manual)" for warning plaques.

PART 3 EXECUTION

3.01 GENERAL

A. Contractor shall inspect site conditions to which work is to be installed. Report discrepancies to Architect in writing.

B. Examine roughing-in for gas piping and electrical control wiring to verify actual locations of connections before equipment installation.

1. Provide underground gas line and associated trenching and filling in compliance with Division 33 Sections or the requirements of the local natural gas utility supplier and authorities having jurisdiction. Comply with requirements of Section 24 14 23 - Facility Natural Gas Piping for piping inside of building.

C. Verify that Fire Pit dimensions, clearances, combustion air ventilation and drainage are in accordance with manufacturer's published directions and listing requirements of the equipment being installed.

3.02 INSTALLATION – FIRE PIT INSERT

A. Install fire pit insert equipment in strict accordance with manufacturer's instructions and as required by appropriate fire authorities.

B. Make connections to burner assembly in accordance with manufacturer instructions and as follows:

1. Provide electrical connectors listed and labeled for wet locations and suitable for use without supplemental applications of electrical tape.

2. Provide corrosion-resistant gas connectors and fittings suitable for exterior use. Provide flexible connector of appropriate length to allow for maintenance access to fire pit.

C. Install primary control station within unobstructed line of sight of the fire pit insert.

D. Install true, plumb, and level. When required by manufacturers instructions securely and rigidly anchor components to substrate in accordance with manufacturer's instructions for each item and each type of substrate construction.

E. Installed gas piping, control wiring, tubing, hoses and clamps, must be hidden from view.

END OF SECTION

Revision Log

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fire Extinguishers and Brackets
2. Fire Extinguisher Cabinets
3. Accessories

1.02 REFERENCES

A. NFPA 10 - Portable Fire Extinguishers

1.03 SUBMITTALS

A. Submit product data which shall include physical dimensions, operational features, color and finish, anchorage details, rough-in measurements, location, and details.

B. Submit manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. National Fire Protection Association (NFPA) Publications:

1. NFPA 10 - Portable Fire Extinguishers

B. Underwriter's Laboratories, Inc. (UL) Standards:

1. UL 4A-60BC classification

1.05 OPERATION AND MAINTENANCE DATA

A. Do not install extinguishers when ambient temperatures may cause freezing.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Larsen's Manufacturing Company (800-527-7367).
2. J. L. Industries, Inc. (800-554-6077).
3. Modern Metal Products, a Division of Technico, Inc. (800-435-5544)

2.02 EXTINGUISHERS:

A. Multi-Purpose, Dry-Chemical Type: Steel Tank, pressurized, including hose and nozzle; 10-pound, ABC classification, UL 4A/60BC.

2.03 BRACKET:

A. Furnish wall mount bracket where shown on Drawings complete with mounting hardware.

2.04 CABINETS:

A. Items specified below are by Larsen's Manufacturing Co. Equivalent products by listed manufacturer will be acceptable.

1. Wall mounted on Bracket (FE): "MP10" Extinguisher with "B2" bracket.
2. Semi-recessed Fire Extinguisher Cabinet (FEC-1): "MP10" Extinguisher with "Architectural Series Model (FS-)SS-2409-6R"; semi-recessed cabinet, projecting 2-1/2", rough opening of 10-1/2"W x 25"H x 4"D. Contractors choice to use FS series in lieu of detail illustrated on Drawing Sheet A-702 to maintain integrity of fire ratings.

B. Cabinet:

1. Semi-Recessed Fire Extinguisher Cabinet: 18 gauge steel with acrylic thermosetting enamel finish box construction, rolled-edge trim type, matching continuous hinge, satin finish pull handle, Type 304 stainless steel door and trim with #4 finish.
   a. Door Style to be Larson "Vertical Duo", or approved substitution by other listed manufacturers. Glazing to be Clear Tempered Safety Glass.
      1) Provide lock similar to "Larsen-Loc" on all cabinets.
   b. Finish: #4 finish for door and trim. Interior of cabinet to be white.
   c. Provide black text "FIRE EXTINGUISHER" on side of cabinet where required by code.

C. Mounting Hardware: Appropriate to Cabinet

D. Fabrication

1. Form body of cabinet with tight inside corners and seams.
2. Pre-drill holes for anchorage.
3. Form perimeter trim and door stiles by welding, filling, and grinding smooth.
4. Hinge doors for 180 degree opening with continuous piano hinge. Provide pull handle and roller type catch.

2.05 FINISHES

A. Extinguishers: Red Enamel

PART 3 EXECUTION

3.01 INSPECTION

A. Verify rough openings for cabinet are correctly sized and located.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install cabinets plumb and level in wall openings. Secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

Revision Log

SECTION 10 51 13 - METAL LOCKERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Locker Units with Hinged Doors
2. Base, Top, and Filler Panels
3. Hooks, Latches, and Hardware
4. Attachment Hardware

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry: Blocking for attachment

1.02 SYSTEM DESCRIPTION.

A. Lockers: Two-tier locker. Provide standard recessed padlock handle, number plate bases, end panels, filler panels, matching sloped top and top filler panels.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit Shop Drawings and product data that clearly indicate locker types, sizes, configurations, layout of groups of lockers, benches, accessories, and numbering plan.
2. Submit manufacturer's installation instructions and actual color samples, on squares of same metal to be used for fabrication.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store and protect locker finishes and adjacent surfaces from damage during installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. “Industrial”; Lyon Workspace Products LLC (800-433-8488)
   a. Color: Refer to Interior Finish Index
2. “Standard Lockers”; Republic Storage Systems Company (800-477-1255)
   a. Color: Refer to Interior Finish Index
3. “Vanguard Lockers”; Penco Products, Inc. (800-562-1000)
   a. Color: Refer to Interior Finish Index
4. “Emperor Locker System”; Hadrian Manufacturing, Inc. (905-333-0300)
   a. Color: Refer to Interior Finish Index

2.02 LOCKER MATERIALS

A. Sheet Steel: ASTM A1008, Mild, stretcher-leveled cold-rolled carbon sheet steel free of buckling, scale, and surface imperfections of the following minimum thicknesses:

1. Body and Shelf: 24 Gauge
2. Doors: 16 Gauge
3. Door Frames: 16 Gauge
4. Hinges: Minimum 2" wide, full loop, tight pin type.

2.03 LOCKER ACCESSORIES

A. Provide each locker with metal number plate, rubber bumpers, hooks and hat/bookshelf.

2.04 LOCKER FABRICATION

A. Locker Units: Provide the following types in locations shown on the Drawings:

1. Two tier units, each locker to be 12" wide x 15" deep x 36" high.

B. Bodies: Formed and flanged with stiffener ribs; per Manufacturer's “series” as listed.

C. Door Frame: Formed channel shape, welded and ground flush, welded to body or as per Manufacturer's “series” as listed.

D. Doors: Welded inner and outer faces; channel reinforced top and bottom with intermediate stiffener ribs. Finish edges smooth.

E. Hinges: Three full loop hinges. Weld securely to unit body and secure to door with no fewer than 2 factory installed fasteners that are completely concealed and tamperproof when door is closed.

F. Recessed Handle and Latch: Manufacturer's standard housing to form a recess for latch lifter and locking devices; non-protruding latch lifter containing strike and eye for padlock; and automatic, pre-locking, pry-resistant latch with latching action with not less than three-point latching. Locking device supplied by Owner.

G. Provide finished filler panels, end panels, continuous sloped 20-gauge metal tops and top filler panels to close off all openings, finished to match lockers.

1. Sloped tops are to be in lengths as long as practicable, but not less than four lockers.

H. Provide matching 12 gage, "Z" type base, 4" high at non-recessed lockers.

I. Trim: 3", 18 gauge steel matching trim for recessed lockers.

J. Provide full perimeter concealed ventilation system.

K. Finish edges smooth without burrs.

L. Provide number plates.

M. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch. Weld frame members together to form a rigid, one-piece structure.

1. Form locker body panels, doors, shelves and accessories from one-piece steel sheet unless otherwise indicated.

N. Accessible Lockers:

1. Accessible Locker to meet ICC/ANSI A117.1-2003-Side Reach Requirement: Single tier lockers shall have a hat/book shelf and coat hooks located no more than 46-inches above the finished floor. One additional shelf shall be placed near the bottom of the locker so that it is no lower than 15-inches above finished floor.

2. Apply a decal with the international symbol of accessibility to the face of the designated handicapped accessible single tier locker, refer to Drawings for location.

2.05 FINISHES

A. Clean, degrease, and neutralize metal; prime and finish with two coats of baked enamel, color as selected by Architect from standard colors.

B. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

C. Finish all steel surfaces and accessories, except prefinished stainless-steel and chrome-plated surfaces.

D. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering prior to shipment.

E. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within 1/2 of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and they are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify bases are properly sized and located.

3.02 INSTALLATION

A. Install metal lockers complete with accessories according to manufacturer's recommendations. Install plumb, level, rigid, flush and in-line.

B. Anchor lockers with appropriate anchor devices to suit materials encountered, to floor and walls. Apply fasteners through back-up reinforcing plates where necessary to avoid metal distortion, using concealed fasteners.

C. Bolt adjoining locker units together to provide rigid installation.

D. Install end panels, filler panels, and tops to completely close-off all openings.

E. Anchor lockers to floors and walls at intervals recommended by manufacturer but no greater than 36 inches (910 mm). Install anchors through back-up reinforcing plates where necessary to avoid metal distortion, using concealed fasteners.

1. Install recess trim to recessed lockers using concealed fasteners. Provide hairline joints and concealed splice plates.

2. Install sloping top units to lockers using concealed fasteners. Provide hairline joints and concealed splice plates.

3. Install finished end panels to conceal exposed ends of non-recessed lockers.

3.03 ADJUST AND CLEAN

A. Adjust doors and latches to operate easily without bending. Verify that integral locking devices are operating properly.

B. Touch-up marred finishes, but replace units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

C. Clean interior and exposed exterior surfaces and polish steel and non-ferrous metal surfaces.

D. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit locker use during construction.

END OF SECTION

Revision Log

SECTION 10 56 13 - METAL STORAGE SHELVING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Metal Storage Shelving

1.02 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this project.

2. Color Chart: Each product specified.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain metal storage shelving through one source from a single manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal storage shelving palleted, wrapped, or crated to provide protection during transit and Project-site storage.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weatherproof, wet work in spaces is completed and dry, and ambient temperature is being maintained at the levels indicated for Project when occupied for its intended use.

1.06 COORDINATION

A. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, and sprinklers.

PART 2 PRODUCTS

2.01 STORAGE SHELVING

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Open Clip Type Shelving" - Republic Storage Systems Company (800-477-1255)

2. "Clip - Support Shelving" - Adapto Storage Products, (800-923-2786)

3. "8000 Series" - - Lyon Workspace Products, LLC (800-433-8488)

4. "Clipper Shelving" - Penco Products, Inc (800-562-1000)

C. Design:

1. Stand alone clip type consisting of 4 angle posts, 2 back sway braces, 4 side sway braces and 6 shelves.

a. 3'-0" Long Units: Minimum 800 pounds load capacity per shelf.

b. 4'-0" Long Units: Minimum 550 pounds load capacity per shelf.

D. Components:

1. Angle posts; 13 gage steel, with slots to receive shelf clips.

2. Shelves: 18 gage steel. Front and back shelf flanges turned down to accommodate 1" x 1" x 1/8" reinforcing angles.

3. Shelf Clips: Type recommended and used by shelving manufacturer for required loading.

4. Sway Braces: 1" x 1/8" band iron with holes at ends for attachment to shelving units.

5. Accessories: As required by classification, design and installation requirements.

E. Finish:

1. Factory finish in manufacturer's standard color selected by Owner's representative.

F. Size and layout as indicated on the Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Set units plumb, level and square. Do not secure to adjacent walls. Adjust for rigidity.

END OF SECTION

Revision Log

SECTION 10 57 23.13 - WIRE CLOSET AND UTILITY SHELVING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wire Closet Shelves

1.02 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this project.

2. Color Chart: Each product specified.

PART 2 PRODUCTS

2.01 WIRE CLOSET SHELVES

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Schulte Corporation (800-669-3225)

a. Standard Guestrooms: “Series 1110-1212-11 Shelf with Hanging Rod”

C. Design:

1. Guest Room Wire Shelves: One (1) shelf to be provided. Top Shelf to be full width of closet mounted at 68 inches above finished floor, with rods spaced at 1-inch centers.

a. Shelf Depth: 12 inches.

2. ADA Guest Room Wire Shelves: Two (2) shelves to be provided. Top Shelf to be full width of closet mounted at 68 inches above finished floor and bottom shelf to be 16 inches long mounted at 48 inches above finished floor, with rods spaced at 1-inch centers.

a. Shelf Depth: 12 inches.

D. Components:

1. Rods: All rods shall be Grade “C” Cold-drawn rod conforming to ASTM A29, Grade C1008, and 100,000 PSI tensile strength.

a. Front Rods: 0.306 inch diameter

b. Back Rods: 0.243 inch diameter

2. Protective Coating: White epoxy coating (applied to a thickness of 3 to 5 mills) custom formulated baked-on anti marring hybrid epoxy.

3. Mounting Hardware: Manufacturer's standard components including anchor clips, end brackets, angled support braces and end caps.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's published instructions, square and plumb, secured rigidly in position.

1. Install Anchor Clip a minimum of 11 inches on center starting 1-1/2” from side walls at level height. Install an inverted Anchor Clip above every Angled Support Brace.
2. Install End Brackets on return walls at front edge of shelf. Secure end brackets to wall as recommended by manufacturer.
3. Install Angled Support Brace at each open end of shelf and every 42 inches of shelf length. Secure Angled Support Brace to wall as recommended by manufacturer.
4. All cut edges of shelving to be capped with plastic end caps.
5. All open ends of shelving to be capped with plastic Double End Caps.

END OF SECTION

Revision Log

SECTION 11 23 00 - COMMERCIAL LAUNDRY AND DRY CLEANING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Laundry and Dry Cleaning Equipment.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry.
2. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: Coordinate equipment lists and schedules.
3. Section 12 30 00 - Architectural Woodwork.
4. Division 22 – Plumbing
5. Division 23 - Mechanical
6. Division 26 - Electrical
7. Food Service & Laundry Equipment Product Manual

1.02 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this Project.
2. Shop Drawings:
   a. Indicate cabinet sizes, materials, details of construction, methods of fastening, location of built-in appliances and erection details.
   b. Indicate locations of plumbing and electrical rough-ins.
3. Samples: Submit samples of wood finish.

1.03 QUALITY ASSURANCE

A. Reference Standards: Applicable requirements of standards and specifications referenced herein apply to the work of this Section.

B. Regulatory Requirements:

1. Conform to all applicable codes for utility requirements.
2. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
3. All gas-fired equipment shall be AGA-Approved and provided with 100% safety pilot lights. Any electric ignition devices or high-heat sensors shall be UL Listed and AGA-Approved.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products clear of floor in a manner to prevent damage.

B. Coordinate size of access and route to place of installation.

1.05 PROJECT CONDITIONS

A. Coordinate the work with location and placement of utilities. Coordinate characteristics of utilities with requirements of food service equipment.

B. Schedule Work to immediately follow installation of utilities and precede installation of room finishes.

C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Refer to Food Service & Laundry Equipment Product Manual

B. Laundry Washer-Extractor:

1. Acceptable Manufacturer: Unimac (800)587-5458
2. Models and Components: UX Softmount Washer Extractor – Foundationless Models, Model No. UW60PV:
   a. Capacity: 60lb. (27.2 kg).
   b. Cylinder Volume: 9.30 cu.ft. (234 L).
   c. Extract G Force: 26-418.
   d. Water Inlet Valves and Size: 2 at 3/4 inch (19 mm), 2 at 1/2 inch (13 mm), all with 3/4NH (19 mm) male connections
   e. Drain Valves and Diameter: 1 at 3 inches (76mm).
   f. Drive Motor: 5 hp
   g. Electrical Requirements: 208v-240v/60Hz/1phase or 3 phase.

C. Dryer Tumbler:

1. Acceptable Manufacturer: Unimac (800)587-5458
2. Models and Components: Dryer Tumbler, Model No. UTF75N/L:
   a. Capacity: 75lb. (34kg).
   b. Lint Filter: 576 sq. in. (3716 sq. cm).
   c. Cylinder Drive: Reversing cylinder.
   d. Door: High Grade stainless steel reversible door with rubber gasket and heavy duty hinge.
   e. Heat Source: Natural Gas, 215, 000 BTU/hr, 1/2in (13mm) NPT with 1 hp fan motor and 1/3 hp cylinder motor.
   f. Electrical Requirements: 208v-240v/60Hz/3 phase.

D. Guest Laundry Washer:

1. Acceptable Manufacturer: Speed Queen (800)345-5649
2. Models and Components: Heavy-duty Washer Extractor (Microprocessor Coin-Drop), Model No. SWTT20/SWTT21(Provide one ADA compliant unit):

a. Cylinder Volume: 2.69 cu.ft. (76 L).

b. Spin Speed: High 710/Low 474.

c. Water Inlet Valves and Size: 2 at 1/2 inch

d. Drain Valves and Diameter: IW, 1" hose to 2"

e. Drive Motor: 2 speed, 1/2 HP reversing for 1725 or 1140 RPM

f. Electrical Requirements: 120/60/1-15amp

E. Guest Laundry Dryer:

1. Acceptable Manufacturer: Speed Queen (800)345-5649

2. Models and Components: Heavy-duty Dryer (Microprocessor Coin-Drop), Model No. SDGT09 (Provide one ADA compliant unit):

a. Capacity: 7.0 Cu. Ft.

b. Air Flows: Gas Models- 220 cfm

c. Drive Motor: 1/3 HP, 5.5 amps and 1725 RPM

d. Heat Source: Natural Gas, 25, 000 BTU/hr, 3/8 in. NPT

e. Electrical Requirements: 120/60/1-15amp

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify condition of existing conditions before starting work. Verify ventilation outlets, service connections, and supports are correct and in required location. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install items in accordance with manufacturers' instructions. Verify water and drains are correct and in the required locations.

B. Insulate to prevent electrolysis between dissimilar metals.

C. Weld and grind joints in steel work tight, without open seams, where necessary due to limitations of sheet sizes or installation requirements.

D. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.

E. Cut, fit, and patch where necessary. Provide cutting and patching of items of this section required for installation or services of equipment. Any field cutting, joining, or patching shall be shop quality, match the surrounding material, and be fully finished and regrained.

F. Cut and drill components for service outlets, fixtures, and fittings.

G. Use anchoring devices appropriate for equipment and expected usage. Wall blocking to be provided of a size and strength necessary to support all wall mounted equipment.

H. Provide clear silicone sealant to achieve clean joint with adjacent building finishes and between abutting components.

3.03 ADJUSTING

A. Adjust equipment and apparatus to ensure proper working order and conditions.

B. Remove and replace equipment creating excessive noise or vibration.

3.04 CLEANING

A. Remove masking or protective covering from stainless steel and other finished surfaces.

B. Wash and clean equipment.

C. Polish glass, plastic, hardware, accessories, fixtures, and fittings.

END OF SECTION

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SECTION 11 25 13 - REGISTRATION EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Deposit Boxes.
2. Employees Depository Safe.

B. Related Sections:

1. Section 05 50 00 - Metal Fabrications:
2. Section 06 10 00 - Rough Carpentry:
3. Section 12 30 00 - Architectural Woodwork:

1.02 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Product Data: Mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this project.

PART 2 PRODUCTS

2.01 DEPOSIT BOXES

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Model No. CSP-17"; Corporate Security Products (301-251-0960)
2. Approved substitution by Hamilton Safe (513-874-3733)
3. Approved substitution by Diebold, Incorporated. (800-999-3600)
4. Approved substitution.

C. Configuration:

1. Model CSP-17: 12 Openings 5" x 5"; 4 openings 5" x 10"; and 1 opening 10" x 10".

D. Overall Dimensions:

1. Model CSP-17: 32-1/2"W x 21"H x 24"D

E. Door Face Material: Polished Aluminum with Stamped Numbers

F. Case and Case Edge Finish: Black

2.02 EMPLOYEES DEPOSITORY SAFE

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "Model No. KR-2116-F, Rev. A"; Corporate Security Products (301-251-0960)
2. Hamilton Safe (513-874-3733)
3. Diebold, Incorporated. (800-999-3600)
4. Approved substitution.

C. Size, outside measurement (verify with manufacturer's submittal).

1. Height: 25-1/4 inches
2. Width: 16-1/2 inches
3. Depth: 23 inches (add 2 inches for handle)
4. Coordinate size and locations with Drawings
5. Provide combination lock with three locking bolts
6. Provide four-compartment coin rack

D. "B" rated door with single lock bolt.

E. DP Hopper style cash drop, 2" x 10" x 8".

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with equipment manufacturer's instructions.

B. Coordinate with approved shop drawings for millwork and Section 12 30 00 - Architectural Woodwork.

END OF SECTION

Revision Log

SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Guest Room and Employee Lounge Appliances

a. Microwave Oven – Undercounter - Provided by Owner

b. Refrigerator - Undercounter - Provided by Owner

c. Garbage Disposal – Provided by General Contractor

d. Refrigerator with Ice Maker - Provided by Owner

e. Microwave Oven - Countertop - Provided by Owner

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry

2. Section 10 28 00 - Toilet, Bath, and Laundry Accessories

3. Section 12 30 00 - Architectural Woodwork

4. Division 22 Sections: Plumbing Fixtures and Equipment

5. Division 26 Sections: Basic Electrical Materials and Methods.

6. Food Service & Laundry Equipment Product Manual

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 and with the following supporting data:

1. Product Data: For each appliance type required indicating compliance with requirements, include complete operating and maintenance instructions for each appliance.

2. Appliance Schedule: Submit schedule of appliances, using the same room designations on Drawings.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the residential appliance manufacturer for installation of appliances required for this Project.

B. Source Limitations: Obtain residential appliances through one source.

C. Electrical Appliances: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

D. UL and NEMA Compliance: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.

E. Deliver appliances only after utility rough-in is complete and construction in the spaces to receive appliances is substantially complete and ready for installation.

PART 2 PRODUCTS

2.01 PRODUCTS

A. Products: Subject to compliance with requirements, provide one of the appliances indicated for each designation in the Residential Appliance Schedule at the end of Part 3.

2.02 MANUFACTURERS (AS IDENTIFIED IN THE APPLIANCE SCHEDULE)

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. GE Appliances Sales (800-770-4651)
2. Aboscold Corp. (800-843-3714)
3. Whirlpool Corporation (800-253-1301)

2.03 FINISHES

A. Exterior Finish: Provide manufacturer's standard factory-applied exterior finish, impervious to cleaning materials commonly used on kitchen appliances, over cleaned and pretreated steel sheet.

1. Color and Gloss: As indicated by manufacturer's designations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine roughing-in for plumbing, mechanical, and electrical services, with Installer present, to verify actual locations of services before residential appliance installation.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: Refer to Division 15 and 16 for plumbing and electrical requirements.

3.03 ADJUSTING AND CLEANING

A. Test each item of residential appliances to verify proper operation. Make necessary adjustments.

B. Verify that accessories required have been furnished and installed.

C. Remove packing material from residential appliances and leave units in clean condition, ready for operation.

PART 4 RESIDENTIAL APPLIANCE SCHEDULE

4.01 APPLIANCES

A. Microwave Oven – Countertop (X-603):

1. Refer to the Interior Design Specification Manual.
2. Location:

a. Guestrooms

B. Refrigerator - Undercounter (X-602):

1. Refer to the Interior Design Specification Manual.
2. Location:
    a. Guestrooms

C. Disposal (K21):
1. Description:
    a. 1/3 Horsepower Motor, 1725 RPM; Line Cord Power Connection; Sound Insulation Package
2. Location:
    a. Employee Dining

D. Refrigerator with Ice Maker (K70):
1. Description:
    a. No-Frost Refrigerator with Factory Installed Icemaker Kit
    b. Provide 10’-0” additional copper tubing coiled behind unit to allow maintenance. Use 90 degree elbow brass fitting to attach copper tubing to allow coiled copper to lie flat against back of unit.
2. Location:
    a. Employee Dining
3. Product:
    a. 16.6 Cu. Ft.: “Model No. GTL17JBWBS w/IM4A Icemaker Kit”; GE Appliance Sales
    b. 17.6 Cu. Ft.: Model No. ER8AHKXR w/IMKIT94 Icemaker Kit”; Whirlpool Corporation
4. Size (W x D x H):
    a. GE: 28"x 31"x 64-3/4"
    b. Whirlpool: 28” x 31” x 68”
5. Electrical:
    a. 120V; 60Hz; 15A.
6. Color:
    a. Clean Steel w/ Black Case

E. Microwave - Countertop (K31):
1. Description:
    a. 1.8 Cu. Ft Capacity Over-The-Range Microwave Oven with Recirculating Venting; 1100 watts; turntable; 10 power levels.
2. Location:
    a. Employee Dining
3. Product:
    a. “GE Profile Model No. JEB1860SMSS”; GE Appliance Sales
    b. ”Whirlpool Model No. GT4175SPS Stainless Steel”; Whirlpool Corporation
4. Electrical:

a. 120V; 60Hz; 13.6A; 1550 Watts

5. Size (W x D x H):
   a. 23-7/8"x 18-13/16"x 13-1/2"
6. Color:
   a. Stainless Steel

END OF SECTION

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SECTION 11 40 00 - FOOD SERVICE EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Food Service Equipment
2. Vending Equipment
3. Buffet Shield System (Sneeze Guard)

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 10 28 00 - Toilet, Bath, and Laundry Accessories
3. Section 12 36 06 – Metal Countertops: Stainless Steel Countertops not associated with Food Service Equipment.
4. Section 12 30 00 - Architectural Woodwork
5. Division 23 Sections: Plumbing Fixtures and Equipment
6. Division 26 Sections: Basic Electrical Materials and Methods
7. Food Service & Laundry Equipment Product Manual

1.02 QUALITY ASSURANCE

A. Reference Standards: Applicable requirements of standards and specifications referenced herein apply to the work of this Section.

B. Regulatory Requirements:

1. Conform to all applicable codes for utility requirements.
2. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

   All gas-fired equipment shall be AGA-Approved and provided with 100% safety pilot lights. Any electric ignition devices or high-heat sensors shall be UL Listed and AGA-Approved.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Store products clear of floor in a manner to prevent damage.

B. Coordinate size of access and route to place of installation.

1.04 PROJECT CONDITIONS

A. Coordinate the work with location and placement of utilities. Coordinate characteristics of utilities with requirements of food service equipment.

B. Schedule Work to immediately follow installation of utilities and precede installation of room finishes. Coordinate with Owner.

C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

PART 2 PRODUCTS

2.01 FOOD SERVICE EQUIPMENT

A. Refer to Food Service & Laundry Equipment Product Manual

2.02 VENDING EQUIPMENT

A. Refer to Food Service & Laundry Equipment Product Manual

2.03 BUFFET SHIELD SYSTEM (SNEEZE GUARD)

A. Refer to Food Service & Laundry Equipment Product Manual

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify condition of existing conditions before starting work. Verify ventilation outlets, service connections, and supports are correct and in required location. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install items in accordance with manufacturers' instructions. Verify water and drains are correct and in the required locations.

B. Insulate to prevent electrolysis between dissimilar metals.

C. Weld and grind joints in steel work tight, without open seams, where necessary due to limitations of sheet sizes or installation requirements.

D. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.

E. Cut, fit, and patch where necessary. Provide cutting and patching of items of this section required for installation or services of equipment. Any field cutting, joining, or patching shall be shop quality, match the surrounding material, and be fully finished and regrained.

F. Cut and drill components for service outlets, fixtures, and fittings.

G. Use anchoring devices appropriate for equipment and expected usage. Wall blocking to be provided of a size and strength necessary to support all wall mounted equipment.

H. Provide clear silicone sealant to achieve clean joint with adjacent building finishes and between abutting components.

3.03 ADJUSTING

A. Adjust equipment and apparatus to ensure proper working order and conditions.

B. Remove and replace equipment creating excessive noise or vibration.

CLEANING

C. Remove masking or protective covering from stainless steel and other finished surfaces.

D. Wash and clean equipment.

E. Polish glass, plastic, hardware, accessories, fixtures, and fittings.

END OF SECTION

Revision Log

SECTION 11 52 13 - PROJECTION SCREENS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Power Operated Front Projection Screens

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 06 20 00 - Finish Carpentry
3. Section 09 51 23 - Acoustical Tile Ceilings
4. Division 26 Sections: Wall switch connected to screen.

1.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.

B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in project with the following supporting data:

1. Product Data: For each type of product specified.
2. Submit Shop Drawings clearly indicating screen sizes and layout, method of attachment, accessories, trim profiles details, finish, and manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of projection screen required from a single manufacturer as a complete unit, including necessary mounting hardware and accessories.

B. Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire suppression system, and partitions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver projection screens until building is enclosed, other construction within spaces where screens will be installed are substantially complete, and installation of screens is ready to take place.

B. Protect screens from damage during delivery, handling, storage, and installation.

PART 2 PRODUCTS

A. POWER-OPERATED WALL PROJECTION SCREEN

B. General: Provide wall or ceiling-mounted projection screen. Screen to have steel case with flat back and baked enamel finish and fitted with power-coated steel end caps concealing roller ends with integral bearing surface to support roller. Mounting brackets to have power-coated finish.

C. Screen: Fabric shall be formed into a pocket holding tubular metal slat. Unit to be furnished with pull cord, metal bumper stops, padded with sponge rubber, and shall be built into case to prevent slat wedging inside case.

D. Material: Fiberglass, Matt White, fire-retardant, and mildew resistant.

E. Size: Coordinate with Owner's Rep.

F. Manufacturers: Roller-Operated Screens

1. Da-Lite Screen Company, Inc (800-622-3737)

2. Draper, Inc. (765-987-7999)

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install projection screens at locations indicated in compliance with screen manufacturer's instructions.

B. Install front projection screens within ceiling alcove, with screen cases in position and relationship to adjoining construction as indicated, securely anchored to supporting substrate, and in manner that produces a smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when screen is lowered.

3.02 PROTECTION AND CLEANING

A. Protect projection screens after installation from damage during construction. If, despite such protection, damage occurs, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

END OF SECTION

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SECTION 12 22 16 - DRAPERY TRACK AND ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Curved Drapery Track at Great Room

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry for blocking and grounds for Drapery Track
2. Section 09 21 16 - Gypsum Board Assemblies for suspended gypsum board ceilings.

C. Related Work to be provided by others as part of the FF&E package:

1. All Drapery and Curtains
2. Drapery Track in Guestrooms and all other public areas.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 - with the following supporting data:

1. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
2. Shop Drawings: Show location and extent of Curved Drapery Track. Include plans, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.
3. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
    a. Ceiling suspension system members and attachment to building structure.
    b. Ceiling-mounted or penetrating items including light fixtures, air outlets and inlets, speakers, sprinklers, recessed shades, and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
    c. Drapery track mounting assembly and attachment.
    d. Minimum Drawing Scale: 1/4 inch = 1 foot (1:48).
4. Samples for Verification:
    a. For the following products:
        1) Drapery track Material: Full-size unit, not less than 12 inches long.
5. Product Certificates: For each type of drapery track, signed by product manufacturer.
6. Qualification Data: For Installer.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain curtain track through one source from a single manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory packages, marked with manufacturer and product name, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not install drapery track until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where drapery tracks are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Owner's Representative and Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 PRODUCTS

2.01 Curved Drapery Track

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. McMurray Company (818-954-8850)
2. Approved Substitution by Marriott International

C. Drapery Track System:

1. Bendable Drapery Track System:
   a. I-Beam Track: Model No. 2300.
   b. Nylon Wheel Carrier: Model No. 2319.
   c. Master Carrier with Arm: Model No. 2382.
   d. Ceiling Splice: Model No. 2355.
   e. Ceiling Bracket: Model No. 2327.
   f. End Stop: Model No. 2356.
   g. Clear plastic Batons required at end of each drapery panel.

D. Fabric: Refer to Interior Finish Index. Fabric furnished and installed by others as part of the FF&E package.

2.02 DRAPERY TRACK FABRICATION

A. Product Description: Drapery Track consisting of a metal track system and carries with roller, a means of attaching the material to the carriers, designed for smooth operation.

B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

C. Unit Sizes: Obtain units fabricated in sizes, custom curved radius and lengths as indicated on drawings.

D. Installation Fasteners: Install fasteners at spacing complying with manufacturer's written instructions.

E. Metal Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

F. Colors of Metal and Plastic Components Exposed to View: As selected by Architect from manufacturer's full range, unless otherwise indicated.

1. Color: White.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 CURVED DRAPERY TRACK INSTALLATION

A. Install Curved Drapery Track level, plumb, and aligned according to manufacturer's written instructions.

B. Drapery Track shall be surface mounted in a curved drapery pocket as indicated on Drawings.

3.03 ADJUSTING

A. Adjust and carriers to operate smoothly, easily, and free from binding or malfunction throughout entire length of track.

3.04 CLEANING AND PROTECTION

A. Clean drapery track surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged drapery track that cannot be repaired, in a manner approved by Owner's Representative and Architect, before time of Substantial Completion.

END OF SECTION

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SECTION 12 30 00 - ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 SUMMARY

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section Includes:
   1. Custom Cabinet Units
      a. Plastic Laminate Custom Box Cabinet Units
      b. Wood, Transparent Finish, Custom Box Cabinet Units
   2. Decorative Glass for Cabinets
   3. Cabinet Hardware

B. Related Sections:
   1. Section 05 50 00 – Metal Fabrications
   2. Section 06 10 00 - Rough Carpentry
   3. Section 06 20 00 - Finish Carpentry
   4. Section 08 80 00 - Glazing
   5. Section 12 36 23 - Plastic Countertops
   6. Section 12 36 61 - Simulated Stone Countertops
   7. Section 12 36 61.13 - Cultured Marble Countertops
   8. Section 12 36 61.16 - Solid Surfacing Countertops
   9. Division 22 for Plumbing Fixtures
   10. Division 26 for Electrical Fixtures

1.02 REFERENCES

A. Architectural Woodwork Institute (AWI) Publication
   1. Section 400 “Architectural Cabinets”
   2. Section 1500 “Factory Finishing”

B. FS MM-L-736 - Lumber, Hardwood

C. FS MMM-A-130 - Adhesive, Contact

D. NEMA LD3 - High Pressure Decorative Laminates

E. PS 1 “Construction and Industrial Plywood”

F. PS 20 “American Softwood Lumber Standard”

G. PS 51 “Hardwood and Decorative Plywood”

H. PS 58 “Basic Hardboard”

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 - with the following supporting data:

1. Submit Shop Drawings and product data. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

C. LEED Submittals:

1. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
2. Laboratory Test Reports for Credit EQ 4: For adhesives and composite wood and agrifiber products, documentation indicating that products meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
3. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content. Include statement indicating costs for each product having recycled content.
4. Certificates for Credit MR 6 Credit MR 7: Chain-of-custody certificates indicating that wood used to produce cabinets and countertops complies with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating costs for each certified wood product.

1.04 QUALITY ASSURANCE

A. Perform work to (custom) quality in accordance with "Quality Standards" of the Architectural Woodwork Institute (AWI).

B. Plastic Laminate Materials shall comply with NEMA LD-3 as follows:

1. GP 50: Horizontal grade
2. CL 20: Cabinet liner
3. BK 20: Backing sheet
4. PF-40: Post Forming Grade
5. FR 50: Horizontal application, fire retardant material
6. FR 32: Vertical application, fire retardant material

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver casework until painting and similar operations that could damage synthetic marble have been completed in installation areas. If casework components must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.01 PLASTIC LAMINATE

A. Plastic Laminate: Shall be standard grade, 1/16" thick, general purpose material complying with current NEMA Standard LD-3 Grade HGS. Comply with ANSI A161.2. Pattern and color shown on Interior Finish Index.

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. Formica Corporation (800-367-6422)

b. WilsonArt International, Inc. (800-433-3222)

c. Lamin-Art (800-323-7624)

d. Nevamar Company, LLC (800-638-4380)

e. Pionite Decorative Surfaces, a Panolam Industries International Incorporated Company (800-746-6483)

f. "Abet Laminati"; ABET Inc. (800-228-2238)

2.02 PLASTIC LAMINATE CUSTOM BOX CABINET UNITS

A. Modular Box-Type Cabinets: Where shown on Drawings, system shall be modular box-cabinet type construction.

B. Manufacturers:

1. Avendra, LLC Preferred Manufacturers:

a. None

2. Approved Manufacturers:

a. Millrock, Inc. (800-645-7625)

b. idX Corporation (410-827-9530)

c. J. Suss Industries Inc. (866-769-5666)

d. Imagineering Inc (614-252-6433)

C. Laminate Clad Cabinets:

1. Materials:

a. Particleboard: Minimum 45 pound per cubic foot; ANSI A208.1.

b. Hardboard: Tempered, ANSI 135.4.

c. Facing: 100 gram melamine resistant to water and typical cleaners.

2. Quality Standard: Comply with AWI Section 400 and Division 400B, "Laminate Clad Cabinets".

3. AWI Type of Cabinet Construction: As Indicated
4. Laminate Cladding:
   a. High-Pressure Decorative Laminate: NEMA LD 3, grades as required by woodwork quality standard, as manufactured by one of the listed manufacturers under Paragraph 2.01.
5. Particle Board: ANSI A208.1, Mat-Formed Particle Board, Grade 1-M-2, with minimum density of 45 pcf. Internal bond of 60 psi, and minimum screw holding capacity of 225 lb. on faces and 200 lb. on edges.
6. Concealed Surfaces: Sound and dry solid wood, plywood, or particleboard without defects affecting strength, utility, or stability.
7. Sides, Dividers, Tops, Bottoms, Shelves, and Stretchers: Plastic laminate GP 50 (0.50 inch nominal thickness) on 3/4 inch thick particleboard. Provide stretchers for top of base cabinet.
8. Back Panels: 1/8 inch thick hardboard with thermoset decorative panels on interior surfaces fastened to rear edge of end panels and to top and bottom rails.
9. Exposed Edge Treatment: Edge doors and drawer fronts with plastic laminate of same material as exposed faces.
10. Semi-Exposed Edge Treatment: Edge top of drawer body with high-impact plastic tee edging. Edge remaining casework surfaces with plastic laminate GP 50 (0.50 inch nominal thickness) matching adjoining plastic laminate in color, pattern, and finish.
11. Doors, Drawer Fronts, Fixed Panels, Toeboards, and Ends: Plastic laminate GP 50 (0.50 inch nominal thickness) on 5/8 inch thick particleboard.
12. Drawers: Fabricate with front, bottom, and back rabbeted in sides and secured with glue and mechanical fasteners as follows:
    a. Subfronts, Sides, and Backs: 3/8 inch thick particleboard.
    b. Bottoms: Not less than 1/2 inch thick vinyl-faced plywood.
13. Interior face of exposed units shall be melamine, wood grain, medium stock color.
14. Interior Cabinet Finish:
    a. Public Space Casework: Interior face of exposed units shall be Black melamine.
    b. Back-of-House Casework: Interior face of exposed units shall be White melamine.
    c. Guestroom Casework: Interior face of exposed units with doors shall be Black melamine. Interior face of exposed units without doors shall be the same as face laminate as shown on drawings.
15. Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect tops and bottoms of wall cabinets and bottoms and stretchers of base cabinets to ends and dividers with mechanical fasteners. Rabbet tops, bottoms, and backs into end panels.
16. Toe Board: 5/8 inch thick particleboard attached to subbase with concealed fasteners.

2.03 WOOD, TRANSPARENT FINISH CUSTOM BOX CABINET UNITS

A. Manufacturers:

1. Avendra, LLC Preferred Manufacturers:
   a. None

2. Approved Manufacturers:
    a. Millrock, Inc. (800-645-7625)
    b. idX Corporation (410-827-9530)
    c. J. Suss Industries Inc. (866-769-5666)
    d. Imagineering Inc (614-252-6433)

B. Quality Standard: Comply with AWI Section 400 requirements for wood cabinets.

C. Hardwood Plywood: ANSI/HPMA HP hardwood and decorative plywood, Good Grade (1) or better, of thickness, species, cut, and core construction indicated.

D. Hardwood Lumber: Clear, dry, sound, and free of defects selected from First Grade lumber (NHLA), of species indicated.

E. Hardboard: ANSI A135.4, Class 1, tempered.

F. Solid Lumber: Dry, sound, selected to eliminate appearance defects, of any species of hardwood or softwood with color and grain characteristics similar exposed portions.

1. Hard Maple - "Select White" (Sapwood), plain (flat) sliced, custom grade.

G. Plywood Face Veneer: Same species as exposed lumber, unless otherwise indicated, selected for grain and color compatible with exposed solid lumber, no defects. Edgeband exposed edges with solid wood of same species as face veneer.

1. Hard Maple - "Select White" (Sapwood), plain (flat) sliced, custom grade.

H. Style of face construction for base, wall, and full-height units, if any, with drawer fronts, doors, and fixed panels as follows:

1. Flush overlay concealing face frames of cabinet body.
2. Flush Door Construction: Lumber core plywood, 5-ply with hardwood face veneer and crossbanding.
3. Flush Drawer Front Construction: Same as door or, where standard with manufacturer, solid or glued-up lumber, not less than 1/2" thick.

I. Construction for face frame style casework as follows:

1. Rails and Stiles for Face Frame: Not less than 1-inch by 1-5/8 inch solid lumber with glued mortise and tendon joints.
2. Exposed Ends: Not less than 1/2 inch thick, medium-density particle board core with exterior veneer to match door and drawer fronts and not less than 4-mil vinyl laminate on interior surfaces. Connect to stile with pressure-glued tongue and plow joint and supplement by concealed mechanical fasteners.
3. Unexposed Ends: Not less than 1/2 inch thick, medium-density particle board with not less than 4-mil prefinished vinyl laminate on interior surfaces. Attach to front frame in same manner as exposed ends.
4. Back, Top, and Bottom Rails: Not less than 3/4 inch by 3 inch solid lumber, machined to interlock with end panels, and rabbeted to receive top and bottom panels; with back rails secured under pressure with glue and mechanical fastening devices.
5. Shelving: Not less than 5/8 inch thick particle board core plywood or 1/2 inch thick medium-density particle board prefinished with not less than 4-mil vinyl laminate on top, bottom, and exposed (front) edge.

J. Construction for wall units with doors and fixed panels as follows:

1. Tops and Bottoms: Not less than 1/2 inch thick particle board or 3/8 inch thick hardwood plywood, fully supported by and secured in rabbets in end panels, front frame, and back rail.
2. Backs: Not less than 1/8 inch hardboard or 3/16 inch plywood fastened to machined rear edge of ends and to top and bottom hanger rails.
3. Interior Cabinet Finish:
   a. Public Space Casework: Interior face of exposed units shall be Black melamine.
   b. Back-of-House Casework: Interior face of exposed units shall be White melamine.
   c. Guestroom Casework: Interior face of exposed units shall be Black melamine.

K. Construction for base units with doors and fixed panels as follows:

1. Front Frame Drawer Rails: Not less than 1 inch by 1-1/4 inch lumber mortised and fastened into face frame.
2. Bottoms: Not less than 1/2 inch thick particle board with 4-mil vinyl laminate finish or 3/8 inch thick, 5-ply veneer core plywood, fully supported by and secured in rabbets in end panels, front frame, and back bottom rail.
3. Back Panels: Not less than 1/8 inch thick hardboard fastened to machine rear edge of end panels and to top and bottom rails. Interior surface prefinished with 4-mil vinyl laminate.
4. Toe Boards: Not less than 5/8 inch particle board core attached between end panels and extended from bottom panel to floor.
5. Corner Blocks: Glued and fastened in each of four top corners to maintain cabinet squareness and rigidity.

L. Construction for drawer units as follows:

1. Drawer Body: Not less than 3/8 inch thick vinyl faced particle board subfront, back, and sides. Provide box-type construction with subfront and back rabbeted into sides and secured with glue and mechanical fasteners. Exposed fronts fastened to subfront with mounting screws from interior of body. Drawer bottom of not less than 1/4 inch thick hardboard, set into rabbets in back, sides, and front.

M. Cabinet Hardware:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers
   a. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group (800-543-3658)
   b. J. G. Edelen Company, Inc. (410-918-1200)
   c. Epco, The Engineered Products Co. (810-767-2050)
   d. Stylmark, Inc. (Garcy Corp.) (800-328-2495)
   e. Hettich America, LP (800-777-1772)
   f. H.B. Ives, an Ingersoll-Rand Company (800-820-5542)
   g. Knape & Vogt Manufacturing Co. (800-253-1561) (KV)
   h. Stanley Hardware, Div. of the Stanley Works (800-493-5263)
   i. Grass America, Inc. (800-334-3512)

j. Hafele America Co. (800-423-3531)

k. Accuride International (562-903-0200)

l. Rockler Companies, Inc (800-279-4441)

m. Doug Mockett & Company, Inc (800-523-1269)

n. Outwater (800-631-2443)

o. Polar Ware (800-237-3655)

p. Keg Works (877-636-3673)

N. Products: Provide cabinet hardware and accessory materials associated with architectural cabinets. Coordinate finishes of exposed cabinet hardware with adjacent finish hardware as specified in Section 08710 (08 71 00).

1. All exposed hardware to be US26D unless noted otherwise.

ITEM	MODEL NO.	MANUFACTURER
GUEST SUITES:		
Guest Suite Wall Cabinet Pulls	109.72.601 x Brushed Nickel	Hafele America
Guest Suite Drawer & Base Cabinet Pulls	109.72.601 x Brushed Nickel	Hafele America
Guestsuite Closet Doors	Refer to Section 08710	
BUFFET		
Drawer Slide Juicer Roller Platform	9301 with bracket kit	Accuride
Extended Alum. Pull (Brushed Stainless)	110258	Stylmark
Cabinet Lock – 7/8”	19109 – US26D 02066	Corbin
Concealed Hinges	1805 VZDT32	Grass America
Condiment Container	2Y Bain Marie (Stain Steel)	Polar Ware
FRONT DESK:		
Cabinet Pull – Stainless Steel	101.20.721 (156mm)	Hafele America
Cabinet and Cash Drawer Locks	19109 – US26D 02066	Corbin
Drawer Slides at Small Drawer	3832	Accuride
Drawer Slides at Large Drawer	7432	Accuride Grant
Concealed Hinges	1805 VZDT32	Grass America
Standards & Clips	255/256 x US26D	KV
Magnetic Catch	41 x US26D	Stanley
Bullet Catches		Stanley
Caster		Shepherd, Selby, or Hercules
THE MARKET		
Extended Alum. Pull (Brushed Stainless)	110258	Stylmark
14” Slatwall Adustable Down Slant Bracket with Front Lip	STA-149-14	Outwater
10” Slatwall Projection Rod	STA-91-10	Outwater
Slatwall with Aluminum Inserts		See Specs 10 11 00
Cabinet Lock – 7/8”	19109 – US26D 02066	Corbin
Concealed Hinges	1805 VZDT32	Grass America
BAR		
Glass Door Hinges (matt chrome)	316.33.300 Type 18	Hafele America
Glass Door Hinge Round Trim Cap	316.10.420	Hafele America
Cabinet Pull – Stainless Steel	101.20.721 (156mm)	Hafele America
Display Cabinet Locks – Surface Mount Lock & Latch	28233	Rockler
Cabinet Lock – 7/8”	19109 – US26D 02066	Corbin
Concealed Hinges	1805 VZDT32	Grass America
Display Cabinet – Continuous Hinge	32611 (1-1/16”W x 36”L)	Rockler

Brushed SS Bar Foot Rail Tubing	920-3S (2" dia)	Keg Works
Brushed SS Bar Rail Bracket	NS913-2	Keg Works
COFFEE BAR / BUSINESS LIBRARY		
Cabinet Pull – Stainless Steel	101.20.721 (156mm)	Hafele America
Cabinet Lock – 7/8"	19109 – US26D 02066	Corbin
Concealed Hinges	1805 VZDT32	Grass America
Straight Steel Tube Furniture Leg	FL3 – 4" Small Leg	Mockett
MEETING ROOM / BOARD ROOM		
Cabinet Pull – Stainless Steel	101.20.721 (156mm)	Hafele America
Cabinet Lock – 7/8"	19109 – US26D 02066	Corbin
Concealed Hinges	1805 VZDT32	Grass America
Display Cabinet Locks – Surface Mount Lock & Latch	28233	Rockler
WORK ROOM, EMPLOYEE AREA, FITNESS		
Cabinet Pull – Stainless Steel	115.61.601 (96mm)	Hafele America
Cabinet Lock – 7/8"	19109 – US26D 02066	Corbin
Concealed Hinges	1805 VZDT32	Grass America

Note: At drawer slides for large drawers, verify potential loading and adjust slide type to accommodate loads. For drawers over 16" wide and less than 24" wide use Accuride 7432. For applications wider than 24" use Accuride 3640.

2. ADA Accessible Guest Room:
   a. Door hardware at kitchen sink: "Pocket Door" retractable doors, hardware system, Julius Blum, or approved substitution.
3. Exposed Wall Shelving: "No. 80 x No. 182"; Knape and Vogt; inset type, adjustable on 1" centers.
4. Cash Drawer With Lock
   a. Avendra, LLC Preferred Manufacturers:
      1) None
   b. Approved Manufacturers
      1) "Money Model No. 1-T"; Whitney Duplicating Check Co. (212-868-0165)
   c. Dimensions:
      1) 15-1/2" W x 10-1/4" L x 2-1/4" H.

2.04 DECORATIVE GLASS FOR CABINET DOORS

A. Avendra, LLC Preferred Manufacturers:
   1. None
B. Approved Manufacturers:
   1. "Model Listral M - 4mm Thick"; Goldray Industries Ltd. (540-937-2330)
   2. "Model Listral"; Charlesbois Co. (514-769-9641)
C. Materials: Refer to Drawings for locations and size.

2.05 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.06 FABRICATION

A. General:

1. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

2. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trip for scribing and site cutting.

3. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings.

B. Woodwork:

1. Interior trim shall be "custom grade" manufactured from solid stock meeting the following requirements:

a. Minor warp which can be held flat and straight with normal nailing.

b. Natural and manufacturing defects in excess of those permitted in the grade specified are permitted if such defects are to be covered by adjoining members or otherwise concealed.

c. Trim members for application on flat surfaces shall have the reverse side "backed out", except members with exposed ends.

d. "Custom grade" pieces shall be smoothly machined with top flat surfaces machine sanded. Depressed flat surfaces and molded contours shall be smoothly machined.

2. Carefully fit equipment to be installed into millwork. Provide filler pieces when required.

3. Protection: Exposed ends of millwork to be sealed with two coats of spar varnish. See Section 09 90 00 - Painting.

2.07 SHOP FINISHING

A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.

B. General: Finish casework at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation. There shall be no field finishing of millwork unless pre-approved by Owner’s rep and Architect.

C. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.

D. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D523:

1. Grade: Custom.

2. AWI Finish System: TR-2 (custom), catalyzed lacquer.

a. Stain Color: Refer to Interior Finish Index.

b. 1 Coat precatalyzed sanding sealer

c. Sand (240 Grit)

d. 1 Coat colored sealer

e. 1 Coat precatalyzed sealer

f. Sand (320 Grit)

g. 1 Coat precatalyzed lacquer - 30% Sheen (semi-gloss) to match approved sample provided by Marriott.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

A. All cabinets and shelving shall be installed as shown on Drawings and as specified by manufacturer.

B. Set and secure casework in place rigid, plumb, and level.

C. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

2. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3. Maintain veneer sequence matching of cabinets with transparent finish.

4. Carefully scribe casework which is against other building materials, leaving gaps of 1/32 inch maximum. Do not use additional overly trim for this purpose.

D. Fasteners:

1. Use purpose designed fixture attachments at concealed locations for wall-mounted components.

2. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units and counter tops.

3. Countersink anchorage devices at exposed locations used to wall-mount components, and conceal with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

4. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3.03 PLASTIC LAMINATE

A. Installation:

1. The plastic laminate shall be bonded to a suitable substrate. Rigid setting type adhesive is recommended. The temperature of the materials, surfacing, substrate, and adhesive, and the area in which the actual fabrication is to be done shall not be less than 65 degrees F. with a relative humidity of not less than 35% and not more than 85%. All inside corners of cutouts in plastic laminate shall be radiused as large as possible with 1/8"R minimum. File edges of the radius smooth and free of cracks and crazes.

3.04 DECORATIVE GLASS

A. Refer to Section 08 80 00 - Glazing, for installation methods.

3.05 ADJUSTING AND CLEANING

A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

B. Clean casework, shelves, hardware, fittings and fixtures.

1. Clean surfaces of plastic laminate with a damp cloth or ordinary bar soap and water. Harsh abrasive cleansers shall not be used. Stubborn dirt may be removed with lacquer thinner, methlethyl Ketone, contact adhesive solvents or cleaner waxes.

END OF SECTION

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SECTION 12 36 23 - PLASTIC COUNTERTOPS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Plastic Laminate
    a. Countertops and Backsplashes
    b. Aprons

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 06 20 00 - Finish Carpentry
3. Section 06 61 13 – Cultured Marble Fabrications
4. Section 12 30 00 - Architectural Woodwork
5. Section 12 36 40 - Stone Countertops
6. Section 12 36 61 - Simulated Stone Countertops

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit Shop Drawings and product data. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives and glues used at Project site, including printed statement of VOC content.
2. Product Data for Credit EQ 4.4: For composite-wood products, documentation indicating that product contains no urea formaldehyde.
3. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
    a. Include statement indicating costs for each certified wood product.

1.03 QUALITY ASSURANCE

A. Perform work to (custom) quality in accordance with " Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute AWI

B. Plastic Laminate Materials shall comply with NEMA LD-3 as follows:

1. GP 50: Horizontal grade
2. CL 20: Cabinet liner
3. BK 20: Backing sheet

4. PF-40: Post Forming Grade
5. FR 50: Horizontal application, fire retardant material
6. FR 32: Vertical application, fire retardant material

1.04 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertops until painting and similar operations that could damage synthetic marble have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where countertop work is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support countertops by field measurements before being enclosed and indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Plastic Laminate: Shall be standard grade, 1/16" thick, general purpose material complying with current NEMA LD-3 Grade HGS for flat countertops and HGP for postformed. Comply with ANSI A161.2. Pattern and color shown in Interior Finish Index.

1. Approved Manufacturers:
   a. Lamin-Art (800-323-7624)
   b. Nevamar Company, LLC (800-638-4380)
   c. Pionite Decorative Surfaces, a Panolam Industries International Incorporated Company (800-746-6483)
   d. Formica Corporation (800-367-6422)
   e. WilsonArt International, Inc. (800-433-3222)

B. Particleboard Core:

1. ANSI A208.1, Grade M-2.

C. Adhesives:

1. Wood Glue: Waterproof types as recommended by AWI standards for the particular application.
2. Plastic Laminate: Non-Flammable Type:
   a. Approved Manufacturers:
      1) "DAP Weld-Wood, Non-Flammable Type" - DAP, Inc. (888-327-8477)
      2) Approved substitution.

2.02 COUNTERTOPS

A. Countertops and Edging: 3/4" B-C particleboard (except at sinks, use exterior grade plywood only with plastic laminate bonded to tops.

1. In locations as required by local codes or ordinances, provide fire retardant countertop assemblies, as tested in accordance with ASTM E 84.

B. Plastic Laminate Work:

1. Where shown as self edged, countertops shall have 3/4" x 4" high square-edged separate matching backsplash and matching aprons with same grade of laminate as top surface unless indicated otherwise.

a. Apply trim and edging prior to surface sheet.

b. Apply veneers or plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline. Locate counter butt joints minimum 2 feet from sink cut-outs.

2. Counters and work tops with sinks: Substrate for back splashes and at edges shall be trimmed lumber. Use only exterior grade or marine grade Plywood near wet areas. All adhesives used near water shall be formulated to be specially water-resistant.

C. ADA Accessible Guest Room:

1. Meet all local and national requirements for access. Minimum work surface shall be as follows:

a. Sink Area: Minimum 28" to 34" maximum above finished floor x 30" in length.

b. Countertop: Minimum 28" to 34" maximum above finished floor x 30" in length.

2. For units which have exposed sides and ends due to placement of accessible units, provide durable, nonabsorbent materials for finish.

3. Provide wall brackets and standards of the type capable of loads of 250 pounds per linear foot of horizontal work surface.

4. Provide brackets capable of supporting work surfaces and loads without leading edge deflection greater than 1/2".

2.03 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.04 FABRICATION

A. General:

1. Shop assemble countertops for delivery to site in units easily handled and to permit passage through building openings.

2. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trip for scribing and site cutting.

3. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

A. All countertops and shelving shall be installed as shown on Drawings and as specified by manufacturer.

B. Set and secure countertops in place rigid, plumb, and level.

C. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

D. Fasteners:

1. Use purpose designed fixture attachments at concealed locations for wall-mounted components.

2. Use threaded steel concealed joint fasteners to align and secure adjoining counter tops.

3. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3.03 PLASTIC LAMINATE

A. Installation:

1. The plastic laminate shall be bonded to a suitable substrate. Rigid setting type adhesive is recommended. The temperature of the materials, surfacing, substrate, and adhesive, and the area in which the actual fabrication is to be done shall not be less than 65 degrees F. with a relative humidity of not less than 35% and not more than 85%. All inside corners of cutouts in plastic laminate shall be radiused as large as possible with 1/8"R minimum. File edges of the radius smooth and free of cracks and crazes.

B. Method:

1. Assembly of components should be accomplished using approved procedures, materials, and equipment, and the workmanship should conform to established industry practices, conditions, procedures, and recommendations.

C. Use single sheet at corners. Seams will not be permitted at corners, unless otherwise approved by Owner's representative.

D. Arrange joints in vertical edges away from common view.

ADJUSTING AND CLEANING

E. Clean surfaces of plastic laminate with a damp cloth or ordinary bar soap and water. Harsh abrasive cleansers shall not be used. Stubborn dirt may be removed with lacquer thinner, methlethyl Ketone, contact adhesive solvents or cleaner waxes.

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END OF SECTION

SECTION 12 36 61 - SIMULATED STONE COUNTERTOPS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Engineered Stone
    a. Countertops and Backsplashes
    b. Thresholds
    c. Sills.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 06 20 00 - Finish Carpentry
3. Section 06 61 13 – Cultured Marble Fabrications
4. Section 12 30 00 - Architectural Woodwork
5. Section 12 36 40 - Stone Countertops
6. Division 22 for Plumbing Fixtures

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. C97 - Test Method for Absorption and Bulk Specific Gravity of Dimensional Stone.
2. C99 - Test Method for Modulus of Rupture of Dimension Stone.
3. C241 - Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.
4. C373 - Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fined Whiteware Products.
5. C482 - Test Method for Bond Strength of Ceramic Tile to Portland Cement.
6. C484 - Test Method for Thermal Shock Resistance of Glazed Ceramic Tile.
7. C531 - Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings.
8. C648 - Test Method for Breaking Strength of Ceramic Tile.
9. C650 - Test Method for Resistance of Ceramic Tile to Chemical Substances.
10. C672 - Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
11. C880 - Test Method for Flexural Strength of Dimensional Stone.
12. C1026 - Test Method for Measuring Frost Resistance of Ceramic Tile to Freeze Thaw Cycling.
13. E84 - Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit Shop Drawings and product data. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

1.04 QUALITY ASSURANCE

A. Engineered Stone Countertops shall be supplied by one manufacturer. Color shall match for all items. Refer to Interior Finish Index.

B. Installer: Trained and approved by countertop manufacturer.

C. Allowable Tolerances:

1. Variation in component size: +/- 1/8 inch in 8 feet.

2. Maximum height of abrupt irregularities: 1/32 inch.

3. Location of openings: +/- 1/8 inch from indicated location.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertop materials until painting and similar operations that could damage engineered stone materials have been completed in installation areas. If engineered stone materials must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install engineered stone materials until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1. Maintain ambient temperature between 50 and 95 degrees F (10 and 35 degrees C) for 48 hours before, during and for minimum 7 days after installation.

B. Field Measurements: Where engineered stone materials are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support engineered stone work by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.07 SPECIAL WARRANTY

A. Quartz Engineered Stone:

1. Provide Ten (10) year Warranty against defects in materials and workmanship.

PART 2 PRODUCTS

2.01 ENGINEERED STONE MATERIALS:

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. VT StoneSurfaces, a Division of VT Industries, Inc. (772-342-3379)

2. “ONE Quartz Surfaces”; Dal-Tile Corporation (630-789-1479)

3. The Stone Resource (336-889-7800)
4. Approved Substitution

2.02 COUNTERTOP MATERIALS

A. Engineered Stone Countertops

1. Composition: Quartz aggregate, resin, and color pigments formed into flat slabs. Slabs shall contain a minimum of 93% quartz.
2. Physical characteristics:
   a. Water absorption: Maximum 0.04 percent, tested per ASTM C97.
   b. Bond strength: Average of 211 PSI (1.4 MPa), tested per ASTM C482.
   c. Modulus of rupture: Average of 6200 PSI (51.1 MPa), tested per ASTM C99.
   d. Flexural strength: 5620 PSI (50.3 MPa), tested per ASTM C880.
   e. Abrasion index: Minimum 62, tested per ASTM C241.
   f. Thermal shock: Pass 5 cycles, tested per ASTM C484.
   g. Thermal expansion: 1.747×10^{-5}, tested per ASTM C531.
   h. Freeze thaw: Class MR3+, tested per ASTM C1026.
   i. Deicing: Pass ASTM C 672.
   j. Flame spread: Class 1 (FS-25 or less), tested per ASTM E84.
   k. Mohs hardness: 6 to 6.5.
   l. Stain resistance: Stains completely removed, tested per ASTM C650, excluding hydroxide.
3. Thickness: 1-1/4 inches
4. Edge detail: Eased. Approve edge condition details with Architect prior to fabrication
5. Color: As shown on Interior Finish Index
6. Surface finish: As shown on Interior Finish Index

2.03 INSTALLATION MATERIALS

A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

B. Adhesive and Sealant as recommended by engineered stone manufacturer.

2.04 FABRICATION

A. General:

1. Clean surfaces to remove loose and foreign matter that could impair adhesion.
2. Remove ridges and projections. Fill voids and depressions with patching compound compatible with setting materials.
3. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.
   a. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

4. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trip for scribing and site cutting.
5. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify adequacy of backing and support framing.

3.02 PREPARATION

A. Condition engineered stone to average prevailing humidity conditions in installation areas before installation.

3.03 INSTALLATION

A. All countertops, shall be installed as shown on Drawings and as specified by manufacturer.

B. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

C. Fit countertops around projections and to adjacent construction. Smooth and clean field cut edges. Ensure that trim will completely cover cut edges.

D. Sound countertops after setting and before grouting. Reset hollow sounding units.

E. Secure joints between adjacent pieces with epoxy adhesive.

F. Fill joints between countertops and adjacent construction with joint sealant. Finish smooth and flush.

G. Adhere sinks and lavatory bowls to tops using manufacturer's recommended sealant, adhesive and mounting hardware.

H. Provide backsplashes, sidesplashes, and aprons as indicated on the Drawings. Adhere to tops using manufacturer's recommended adhesive.

3.04 ADJUSTING, CLEANING & PROTECTION

A. Keep components clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained and damaged components.

B. Protect surfaces from damage until Date of Substantial Completion. Repair work or replace damaged work which cannot be repaired to Marriott Representative's satisfaction.

END OF SECTION

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SECTION 12 36 61.13 - CULTURED MARBLE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Countertops and backsplashes.
2. Thresholds.
3. Sills.

B. Related Sections:

1. Division 12 Section "Stone Countertops."
2. Division 22 Section "Plumbing Fixtures" for nonintegral sinks.

1.3 SUBMITTALS

A. Product Data: For countertop materials.

B. LEED Submittals:

1. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
2. Credit EQ 4: Laboratory test reports for adhesives and sealants indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
3. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

D. Samples for Initial Selection: For each type of material exposed to view.

E. Samples for Verification: For the following products:

1. Countertop material, 6 inches (150 mm) square.
2. One full-size cultured marble countertop, with front edge and backsplash, 8 by 10 inches (200 by 250 mm), of construction and in configuration specified.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.5 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 CULTURED MARBLE COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:
   1. Thickness: 1-1/4 inches
   2. Edge detail: Eased. Approve edge condition details with Architect prior to fabrication
   3. Backsplash: 1/2 inch, straight with slightly eased edge at top.
   4. Endsplash: Matching backsplash.
   5. Color: As shown on Interior Finish Index.
   6. Surface finish: As shown on Interior Finish Index.

2.2 INSTALLATION MATERIALS

A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

B. Adhesive and Sealant as recommended by countertop manufacturer.

2.3 FABRICATION

A. General:
   1. Clean surfaces to remove loose and foreign matter that could impair adhesion.
   2. Remove ridges and projections. Fill voids and depressions with patching compound compatible with setting materials.
   3. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.
      a. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.
      b. Fabricate tops to receive under counter mounted sink specified in Division 22.
   4. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trip for scribing and site cutting.
   5. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify adequacy of backing and support framing.

3.2 PREPARATION

A. Condition engineered stone to average prevailing humidity conditions in installation areas before installation.

3.3 INSTALLATION

A. All countertops, shall be installed as shown on Drawings and as specified by manufacturer.

B. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

C. Fit countertops around projections and to adjacent construction. Smooth and clean field cut edges. Ensure that trim will completely cover cut edges.

D. Sound countertops after setting and before grouting. Reset hollow sounding units.

E. Secure joints between adjacent pieces with epoxy adhesive.

F. Fill joints between countertops and adjacent construction with joint sealant. Finish smooth and flush.

G. Adhere sinks and lavatory bowls to tops using manufacturer's recommended sealant, adhesive and mounting hardware.

H. Provide backsplashes, sidesplashes, and aprons as indicated on the Drawings. Adhere to tops using manufacturer's recommended adhesive.

3.4 ADJUSTING, CLEANING & PROTECTION

A. Keep components clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained and damaged components.

B. Protect surfaces from damage until Date of Substantial Completion. Repair work or replace damaged work which cannot be repaired to Marriott Representative's satisfaction.

END OF SECTION

12 48 13 - ENTRANCE FLOOR MATS AND FRAME

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Recessed walk-off mat.

B. Related Sections:

1. Section 03 30 00 Cast-In-Place Concrete.
2. Section 08 41 13 Aluminum-Framed Entrance and Storefronts.

1.02 PERFORMANCE REQUIREMENTS

A. Load: system to support uniform load of 100 psf plus point load of 300 lbs at any location at without damage to components.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's catalog cuts and other information showing sizes, materials, finishes, and anchorages/fastenings to adjacent materials and construction.

B. Submittals: Submit the following:

1. Insert Materials: For color selection from manufacturer's full range.
2. Supporting Aluminum: Minimum 12" x 12", showing treads, lock bars, and insert material.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide conforming products from one of the following:

1. Construction Specialties, Inc., Base Specification.
2. Arden Architectural Specialties, Inc., St. Paul, MN.
3. Balco Inc., Wichita, KA.
4. J.L. Industries, Bloomington, MN.
5. MM Systems, Tucker, GA.

2.02 MANUFACTURED UNITS

A. C/S Model #M1 Pedimat with aluminum level base frame manufactured by Construction Specialties, Inc.

B. Fabrication: Recessed extruded aluminum frame with extruded aluminum connecting rails and heavy duty carpet inserts:

1. Inserts: #M1HC Mono tuft HD, solution dyed nylon carpet; 32oz/yd^2
2. Color: to be selected from manufacturers standard colors
3. Aluminum: 6063-T6 alloy extruded, clear anodized, aluminum with drainage perforations.
4. Frame: ¾” deep 6063-T6 alloy extruded aluminum block out frame with1/4” exposed face.

5. Tread spacing: 2” with black vinyl fillers for increments less than 2”.

PART 3 EXECUTION

3.01 INSTALLATION

A. Examination: Examine work of other trades prior to commencing installation, and notify Architect of defects which may be detrimental to successful installation of work under this Section.

B. Install grilles in accordance with manufacturer's instructions.

C. Set frames for recessed work to be flush with finish floor surface.

D. Coordinate with work of other trades including drains and lighting. Provide cutouts for lighting fixtures and convenient methods for grille removal without disturbing light fixtures and relamping without disturbing grille.

END OF SECTION

SECTION 12 54 13.13 - HOSPITALITY FURNITURE INSTALLATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. The complete installation of all furniture and fixtures which are furnished by Owner.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry: Blocking for wall mounted furniture and fixtures.

1.02 QUALITY ASSURANCE

A. Qualified installer shall have experience in installation methods similar to work of this section.

1.03 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall receive and store all items furnished by Owner.

B. The storage area shall be secure and dry with temperatures maintained above 40 degrees F. at all times.

C. For each delivery, the Contractor shall fill out receiving reports. Each delivery shall be inspected for damage. All damage shall be noted on the carriers delivery slip as well as the receiving report. Receiving reports and carriers delivery slips shall be forwarded to the Owner immediately upon receipt of delivery. If damaged material is not reported when discovered, the Contractor assumes full responsibility.

PART 2 PRODUCTS

2.01 MATERIALS

A. Headboard Mounting Items:

1. 2 ea 3" x 3/16" toggle bolts.
2. Silicone adhesive.
3. Lead shields (concrete walls only).
4. 2 ea 2" #10 pan head screws for each cleat.

B. Box Spring and Bed Frame Mounting Items:

1. 4 ea #10 x 3/4" pan headed screws.

C. Artwork and Framed Mirror Mounting Items:

1. 2 ea 1/8" x 3" toggle bolts for each item.
2. Lead shields (concrete walls only)
3. 2 each 2" #10 pan head screws (concrete walls only).

PART 3 EXECUTION

3.01 INSTALLATION

A. Contractor shall exercise care when installing items so as not to damage or soil adjacent areas and surface.

B. Headboard Installation:

1. Mount cleat to wall using toggle bolts as required.
2. Apply three (3) 1" spots of silicone adhesive to bottom rail of headboard.
3. Set headboard on wall cleat and press firmly into place.
4. Clean excess adhesive from wall with approved cleaner.

C. Box Spring and Bed Frame Installation:

1. Be sure box spring is properly set in bed frame.
2. Drill 4 ea. - (2 to each side of box springs). Three holes provided in bed frame.
3. Install screw to each hole and tighten in a workmanship manner until box spring is secured to frame.

D. Artwork: Install using picture wire, or security cleats and silicone adhesive.

E. Lamps and shades: Install complete with bulbs, if directed by Owner's representative, staple excess lamp cord to the back of furniture.

END OF SECTION

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SECTION 13 11 00.02 - SWIMMING POOLS - INDOOR

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pool Constructed of Gunite and Shotcrete System.
    a. The Pool Contractor shall be responsible for design and installation of indoor pool and spa system.
2. Pool Contractor shall be responsible for submitting and securing necessary approvals and permits, including payment of fees, and expenses for the preparation of any required documentation.
3. Vapor Retarder installed at slab-on-grade, framed wall and ceiling construction at the Indoor pool area and Pool equipment room.

B. Related Sections:

1. Section 09 21 16 – Gypsum Board Assemblies (Vapor Retarder)
2. Section 09 30 00 – Tiling
3. Division 22 and 26 Specifications for the following:
    a. Excavation for electrical and plumbing lines.
    b. Pool deck hose bibs.
    c. Cold water supply within pool equipment room.
    d. Gas line for pool heaters.
    e. Conduit wiring, receptacles and disconnects to the pool equipment room.
    f. Pool heater flues.
    g. Filter room, decks, sealing of joints between pool and deck, shall be provided as work of other sections.
    h. Connection of floor & deck drains and hose bibs is specified in Division 22. Connection of floor & deck drains shall be performed by Pool Contractor.
    i. Connection of pool heater to gas source and heater vent piping in equipment room shall be performed by Contractor.
    j. Provisions for combustion air.
    k. Automatic water fill system and fill spout cold water lines from water source in equipment room is specified in Division 22, but all connections shall be performed by Pool Contractor.
    l. Connection of all pool equipment, starters and switches; grounding of pool, pool equipment, pool lights and niches, and wiring of pool & spa lights from electrical panel in equipment room is specified in Division 26.
    m. The underwater pool niche lights shall be connected to emergency power.
4. Section 31 20 00 - Earthwork

1.02 REFERENCES

A. Applicable requirements of the following Specifications and Codes apply to work of this Section:

1. National Spa and Pool Institute (NSPI): Minimum Standards for Public Swimming Pools.
2. Local building and health codes.
3. National Electrical Code (NEC).
4. National Sanitation Foundation (NSF): Seal of approval program.
5. Gunite Contractors Association (GCA): Technical Publication G-84, entitled Gunite and Shotcrete.
6. American Society for Testing and Materials (ASTM): Specifications referenced herein.
7. American Society of Mechanical Engineers (ASME) Coding and Labeling.
8. Tile Council of America, Inc. "Handbook for Ceramic Tile Installation".
9. All pools and spas shall comply with ANSI/APSP-7 "American National Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins".

1.03 SYSTEM DESCRIPTION

A. System shall include:

1. Pool Contractor shall provide systems of fully compatible components and construction methods required for complete and operable systems for indoor swimming pool including but not limited to excavation, dewatering of construction area and removal of excess earth from site.
2. Gunite and shotcrete shell.
   a. Finish Plaster Mix (Diamond Rite).
3. Under-slab and wall & ceiling applied vapor retarder in the pool area.
   a. Slab Vapor Retarders: ASTM E 1745, Class C.
      1. Permeance (Perm) Not greater than 0.05 grains/hr/ft^2 h in. Hg; ASTM E 96, “Water Method”.
      2. Tensile Strength: Not less than 13.6 lbf/in.
      3. Puncture Resistance: 475 grams; ASTM D 1709.
   b. Wall and Ceiling Vapor Retarders: ASTM E 1745, Class C
      1. Permeance (Perm) Not greater than 0.05 grains/hr/ft^2 h in. Hg; ASTM E 96, “Water Method”.
      2. Tensile Strength: Not less than 13.6 lbf/in.
      3. Puncture Resistance: 475 grams; ASTM D 1709
4. Excavating, hauling, backfilling, grading and incidental earthwork in conjunction with the construction of the swimming pool.
   b. Handle and dispose of excess material, regardless of type, character, or composition.
5. Connections of water and gas to pool equipment.
6. Connections of motors, pumps, compressors, switches and timers, lights, and wiring necessary for interfacing of equipment.
7. Pool Equipment.

a. Filter Systems
b. Flow Meters
c. Water Treatment Systems
d. Heaters
e. Recirculation Pumps and Motors
f. Piping
g. Fittings, Lights and Accessories
h. Deck Drain System
1) Automatic Water Fill System and Fill Spout

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 and with the following supporting data:
1. Product Data:
a. Manufacturer's technical literature with installation and storage instructions for each product specified.
b. Pumps: Pump performance curves indicating GPM vs. TDH, maximum efficiency point, and maximum amperage draw, together with current characteristics and service factor of motor.

B. Shop Drawings
1. Submit the following Shop Drawings to the Owner's Agent for approval:
a. Complete design of swimming pool, including all component parts, attachments, devices, or other work, filtration filter, size, turn-over capacity, and supporting calculations.
b. Foundation plan, details and sections through pool shall be included.
c. Mechanical schematic.
d. Detail for ladder and pool wall interface.
e. Show all shop erection details.
2. All Shop Drawings shall be certified and sealed by a Professional Engineer, registered in the state in which project is being submitted.
3. The pool manufacturer shall certify to the Owner that the depth and configuration of the pool is acceptable and compatible with all known safety standards and governing agency regulations for the manufacturer's designed product.

C. Samples:
1. Precast concrete pool coping deck and in-pool deck, One-12" long section of coping, complete with tile depth marking.
2. Submit three (3) samples of each type and color of tile required.

D. Quality Control:
1. Design Data:
a. Hydraulic analysis: Engineer's sealed calculations and total dynamic head (TDH) for swimming pool system for equipment other than that specified.

b. Structural analysis: Engineer's sealed calculations and analysis for pool concrete design. The Pool Contractor shall base his design upon plans, details, and sections as shown in the Drawings. The structural calculations, design, and engineering of the pool foundation, floor and walls is the responsibility of the Pool Contractor's engineer.

E. At the completion of the work, the Pool Contractor shall furnish to the Owner two bound copies of an operation manual. Minimum content of these manuals shall be:

1. Operating Instructions
2. Equipment Literature with Parts List of all Equipment
3. Water Chemistry Procedures
4. Suggested Safety Procedures
5. Repainting/Refinishing Procedures
6. Include chemical analysis of source/make-up water supply
7. Copies of all manufacturer's warranties
8. Test reports
9. Sealed Engineer's drawings.
10. Certificates: From local authorities indicating that pool construction and performance conform to requirements of respective authorities.

F. At the completion of the work, the Pool Contractor shall fill the pool with water and instruct the Owner's operating personnel in the operation of all equipment.

G. The Pool Contractor shall test the Owner's natural water supply and furnish and supply start-up treatment as required for start-up, including requirements to balance total alkalinity and calcium hardness, and shall obtain same.

1.05 QUALITY ASSURANCE

A. All work under this Section must be performed by a Pool Contractor experienced and regularly engaged in building, commercial swimming pools. Pool Contractors bidding this work must have completed five (5) projects within the past ten years equal to or larger than this project.

B. Pool specification and related pool drawings are to be considered as performance guidelines only meeting minimum requirements which may change as result of local code and health department requirements.

1. The project Drawings and Specifications supplement each other. In the event of a conflict, the Specifications shall govern. Piping locations are schematic. Precise locations of piping shall be determined by the Pool Contractor to address actual field conditions. Fittings are not shown. The Pool Contractor shall include all fittings normally required for a completed system.
2. The Pool Contractor shall be responsible for reviewing the complete set of Contract Documents and coordinate work with other trades.

C. All work under this Section shall be inspected and installed in accordance with all current local and state codes and regulations.

1. The Pool Contractor shall obtain the following:
   a. Board of Health Design Approvals
   b. State Board of Health Inspections and Final Approval
   c. Structural and Electrical Inspections and Final Approvals on his Portion of the Work

D. The standards of these Plans and Specifications are intended to provide the Owner with a low maintenance pool.

E. Pool Contractor shall be responsible for design and installation of pools, including layouts, routing of piping, as well as the proper location and quantities of required accessories. Responsibilities also include necessary valves, devices, and controls for pool system as required.

F. Pool Contractor's design drawings must be sealed and signed by a licensed Engineer registered in State in which project is being constructed.

G. Pool Contractor shall submit, on his letterhead, a list of all variations and deviations he finds that differ between local code requirements and bid drawings.

H. Slab Vapor Retarders shall meet or exceed requirements of ASTM E 1745, Class A.

J. Work shall be performed by Contractor experienced in this type of application.

K. Vapor barrier and joint sealing material must be from same manufacturer.

L. Polyethylene sheet shall be manufactured:

1. Free of recycled products and fillers, but with special additives for UV resistance, flexibility, and other desired attributes.

2. From high-density polyethylene (HDPE) except for fire-retardant formulations.

1.06 PROJECT CONDITIONS

A. Coordination: Pool Contractor shall coordinate pool-related work with the work of other Specification Sections and Contractors to avoid any delay or interference with other work.

1. Filter room, decks, sealing of joints between pool and deck, fencing and landscaping shall be provided as work by the General Contractor.

2. Connection of all pool equipment, starters and switches; grounding of pool, pool equipment, pool lights and niches, and wiring of pool lights shall be performed by the Pool Contractor’s Subcontractor from electrical panel in the adjacent mechanical room.

3. Pool Contractor shall provide connection of the pool drains and pool deck drains to the primary system drains. The Pool Contractor shall coordinate pool and deck drain connections with work of the Plumbing Contractor. See Drawings for locations.

4. The Pool Contractor shall provide the equipment room connections from the pool heater to the gas source and heater vent piping that occur within the equipment room. The Pool Contractor shall coordinate Work with the Plumbing and Mechanical Contractors. The Plumbing Contractor shall provide the connection between the Pool Contractor’s equipment and the gas piping source and vent stack riser. (The Plumbing Contractor shall provide the related water line, drain line, and gas line to the pool area as shown on the drawings.

5. Provisions for combustion air shall be provided by the Mechanical Contractor as shown on the drawings. Final pool heater flu vent selection will need to coordinate with selected pool heater.

6. Connection of automatic water fill system and fill spout cold water lines from water source in the equipment room shall be performed by the Pool Contractor.

B. Lines, Grades, and Elevations:

1. The General Contractor shall establish a bench mark for elevations and control points for measurements and layouts. The Pool Contractor shall be responsible for lines, grades, and measurements from these points required for the installation of the pool.

C. Utilities:

1. The General Contractor shall supply the water required for construction, filling and testing of the pool from the permanent, accepted water system.

1.07 WARRANTY

A. The Pool Contractor shall warranty his work against defects in labor and equipment, including paint, for a period of one year from Substantial Completion. Substantial Completion shall be defined as the date of acceptance by the Owner or initial usage, whichever occurs first. This warranty shall not include minor defects that do not affect the use of the pool such as scratches, minor dents, or concrete curing cracks.

PART 2 PRODUCTS

2.01 MANUFACTURERS: The following manufacturers are approved for use as identified in the individual paragraphs below:

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. A & B Brush
2. Action/Haviland (800-333-0400)
3. American Olean Tile Co. (800-933-8453)
4. American Products
5. Anchor Industries, Inc. (800-544-4445)
6. Berkeley (Sta-Rite Water Systems) (888-237-5353)
7. Bio-Lab, Inc. (800-959-7946)
8. Blue White Industries (714-893-8529)
9. Cal-June, Inc. (818-761-3516)
10. Dal-Tile Corp. (800-933-8453)
11. Degroot Studios (954-587-5487)
12. Federal Stone Industries, Inc. (800-513-5030)
13. Frost Co. (Inter-Fab) (800-737-5386)
14. A. J. Giammanco & Associates, Inc. (Lion Pool Products) (800-546-6766)
15. Gould Pumps, Inc (315-568-2811)
16. Grace Construction Products (800-778-2880)
17. Guardex (Bio-Lab) (800-959-7946)
18. Halogen Supply (800-777-7946)
19. Hydrotech (Bio Lab). (800-795-7946)
20. Jandy (707.776.8200)
21. Lochinvar Corp. (615-889-8900)
22. Mameco International, Inc.; a Division of Tremco, Inc. (800-321-6412)
23. Mec-O-Matic (Pulsafeeader) (800-333-6677)

24. Mortex Manufacturing, Inc. (800-338-3255)
25. Omni (Div. Bio-Lab) (800-959-7946)
26. PAC-FAB, Inc. (see Paragon Aquatics) (800-983-7665)
27. Paragon Aquatics, a Division of Pentair, Inc. (845-463-7200)
28. Pentair Pool Products (800-843-5628)
29. Purex (see Pentair Products)
30. Quaker Plastic Corporation (888-288-6644)
31. Rainbow, a Brand of Pentair, Inc. (800-831-7133)
32. Raypak, Inc (818-889-1500)
33. George Fischer Signet Scientific Co. (800-854-4090)
34. S. R. Smith Commercial (888.677-7776)
35. Spectrum Aquatics (800-776-5309)
36. StaRite Pool and Spa Group a Pentair Company (800-843-5628)
37. Stenner (800-683-2378)
38. Stegmeier, LLC (800-382-5430)
39. Swimquip (See Sta-Rite Pool Spa Group) (800-752-0183)
40. Taylor Technologies. (800-837-8548)
41. Teledyne Laars (415-382-8220)
42. Whitten (Aquatic Development Group) (518-783-0038)
43. W. R. Meadows, Pool Deck Construction Products (800-542-7665)
44. VAK PAK (800-877-1824)

2.02 POOL STRUCTURE - GENERAL

A. Size of pool shall be as shown on Drawings.

B. Joint sealant shall be polyurethane, Mameco Vulkem No. 45.

C. Ceramic Tiling: Tile used in conjunction with surfaces in contact with water shall be furnished and installed by the Pool Contractor.

D. Perimeter and general purpose sealants shall be polyurethane, refer to Section 07 92 00

2.03 POOL MATERIALS

A. Concrete:

1. Definitions:

a. Gunite: Dry-mix. Originally a trade name used to designate a mixture of Portland cement and sand thoroughly mixed dry, passed through a cement gun and conveyed by air through a flexible tube, hydrated at the nozzle and placed by air pressure.

b. Shotcrete: Wet-mix. transit-mix (ready-mix) combination of Portland cement, aggregates and water, pumped in a plastic state to the nozzle, where air is added to place the material.

2. Materials and mixes for "Gunite" and shotcrete shall conform to GCA publication G-84.

3. Gunite:
   a. Aggregate: ASTM C 33, washed sand; clean, hard, sharp particles, well graded in size within the following limits:

Size	Percent by Weight
Passing through 3/8 inch screen	100
Passing through No. 4	95 to 100
Passing through No. 8	65 to 90
Passing through No. 16	45 to 75
Passing through No. 30	30 to 50
Passing through No. 50	10 to 22
Passing through No.100	2 to 8

   b. Mix one part cement to 4 1/2 parts of sand based on dry, loose volume (minimum 3,000 psi compressive strength in 28 days).
   c. Portland cement and water: As specified hereinafter.
4. Shotcrete:
   a. Transit mix (ready-mix) materials conforming to aggregate specified above for "Gunite" and with the additional following grading for pea gravel:

Sieve Size	Percent by Weight
1/2"	100
3/8"	90

   b. Mix Strength: Minimum 5,000 psi compressive strength in 28 days.
   c. Submit design mix and certify material for weight, water content and mixing time.
   d. Portland Cement and Water: As specified hereinafter.
5. Portland Cement: ASTM C150, Type I or II.
6. Water: Potable.
7. Forms: Exterior plywood, APA-B8 Plyform Class 1, mill-oiled.
8. Form Oil: Lacquer or resin type compatible with mill-oil.
9. Reinforcing Steel: ASTM A615 grade 40.
10. Gauging Wires: Piano wire, 0.027" thick.

B. Ceramic Tiling:
1. Refer to Interior Finish Index
2. Approved Manufacturers:
   a. DeGroot Studios, (305-462-3445)
3. Unglazed Ceramic Mosaic tile at Step Nosings:
   a. Approved Manufacturers:
      1) Dal-Tile Corp
      2) American Olean Tile Co.
4. Provide certification by manufacturer for use in pools.
5. Refer to Drawings and Interior Finish Index for size and location 2" x 2" at water line below coping cap and at spa seating areas. See drawings for location of special 8” x 8”

tile with 6” high silk screened depth marking in feet and inches as required by local and state public swimming pool codes. Adjacent to each depth marker, provide international symbol "No Diving" sign tile. "No Diving" tile shall be 8” x 8” for skim-line and 8" x 8" for deck (non-slip) white ceramic with black lettering and markings and a red circle with cross hatch,

6. Depth marking and no diving tiles shall be placed on the vertical pool walls as part of the 8” tile band below the coping so as to be easily readable from the water side. Depth marking and "No Diving" tiles on the horizontal surface of deck, shall be within 18" of the water edge and positioned to be read while standing on the deck facing the water. Pool markings shall be placed at maximum and minimum depths, all points of slope change, at every one foot of depth increment. Markers shall be spaced at no more than 25 foot intervals and arranged to be uniformly located at the ends and sides of the pool. Refer to Drawings for details and locations.
7. 2” x 2” non-slip unglazed ceramic mosaic tile in color as shown in the Interior Finish Index at step nosings forming a 2” horizontal and 2” vertical band.
8. Tile Mortar and Grout: As specified in Section 09 30 00 – Tiling.
9. Refer to Interior Finish Index for colors.

C. Finish Plaster Mix:
   1. White marble, White waterproof cement and bonding agent.
   2. Approved Manufacturers:
      a. “Diamond Brite” Pool Finish; SGM Aqua Quartz.
      b. No substitutions.
   3. Finish and Color: Selected by Owner’s Representative

D. Sealant and Back-Up Material: See Section 07 92 00 - Joint Sealants

E. Precast Concrete Pool Coping:
   1. Precast concrete, wet pour, white, 12" wide x minimum 2' long bull nosed coping stone with raised slip resistant pattern on upper surface. Provide one-piece radius corners.
   2. Provide bonding coat as recommended by finish manufacturer.

2.04 FILTER SYSTEM

A. Pressure Filters:
   1. Approved Manufacturers:
      a. Paragon Aquatics, a Division of Pentair, Inc. (845-463-7200)
      b. StaRite Pool and Spa Group a Pentair Company (800-843-5628)
      c. Approved Substitution
   2. Filter systems: Listed as approved by the National Sanitation Foundation for sand filters at flow rates of 20 GPM per square foot of filter area, and bear the National Sanitation Foundation Seal of Approval. Maximum filter flow rate shall not exceed 15 GPM per square foot of filter area.
   3. Filter or Filter Battery Stainless steel or fiberglass hi-rate pressure sand filters.
   4. Include with each filter top mounted influent pressure gauge, reading 0 to 60 psi, manual air release valve, multi-port diameter valve, backwash site glass and transparent dome top.

B. Filter Media: Sand, with an effective size of 0.45 to 0.55 mm with uniformly coefficient of 1.6 maximum.

C. Filter Face Piping:

1. Pipe, valves, and fittings shall make a complete unit or battery from inlet to outlet.
2. Arrange piping to carry out operations of filtering, backwashing and by-pass of filter for pool draining.
3. Face pipe and fittings: PVC SCH 40.

2.05 FLOW METERS

A. Flow Meter:

1. Approved Manufacturers:
   a. Paragon Aquatics, a Division of Pentair, Inc. (845-463-7200)
   b. StaRite Pool and Spa Group a Pentair Company (800-843-5628)
   c. "CF-300 Series; Blue White Industries, pilot tube type.
   d. Approved Substitution by Signet Scientific Co.

2.06 WATER TREATMENT SYSTEM

A. Chemical feeder by Owner.

B. Chemical Feeder:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers:
   a. “Model 25163000”; Hydrotech
   b. Approved Substitution by Omni
   c. Approved Substitution by Guardex
   d. Approved Substitution
3. Include in-line flow meter, flow control valve, clear dome top and shut-off valves on both sides of feeder.
4. Quantity: one at pool.

C. Chemicals:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers:
   a. "SpaBrom" bromine sticks - Hydrotech 20 lb.

D. Test Kit:

1. Approved Manufacturers:
   a. "#K-1744-H"; Taylor Technologies
   b. “#26122000”; “Guardex” Bio-Lab.

2.07 POOL HEATER

A. Pool Heaters:

1. Approved Manufacturers:

a. Telodyne Laars (415-382-8220)

b. Raypak, Inc (818-889-1500)

c. Approved Substitution.

B. Heater:

1. Size heater, as appropriate, for pool size as shown on the Drawings. Heater shall maintain a temperature of 80 degrees F for pool.

2. Heaters must be A.S.M.E. coded and labeled.

C. Furnish in-line thermometer with 2 degrees F. intervals and a minimum range of 60-120 degrees F.

2.08 RECIRCULATING PUMP AND MOTOR

A. Pumps:

1. Approved Manufacturers:

a. Paragon Aquatics, a Division of Pentair, Inc. (845-463-7200)

b. StaRite Pool and Spa Group a Pentair Company (800-843-5628)

2. Self priming unit with hair and lint strainer capable of delivering the designated GPM at the designated head during the filtering operation without overloading along the full length of the pump curve.

B. Pump Motors:

1. Energy efficient, UL listed "E-plus Century"; Gould Pumps, Inc.

2. Electrical Characteristics: As shown on Drawings

2.09 PIPING

A. Piping within filter room: Polyvinyl chloride (PVC), Type 1-1220, Schedule 40 IPS, Class #135. N.S.F. approved and labeled.

B. Pool fill line: Schedule K copper.

C. Filtered water supply piping to pool: Schedule 80 PVC. N.S.F. approved.

D. Filter connection piping which connects the filter plant to the filter pump and to the recirculation piping, backwash piping and other piping associated with filter system: PVC, Type 1-1220, Schedule 40 IPS, Class #135. N.S.F. approved and labeled.

E. Fittings for PVC pipe: Whenever PVC pipe is used, all fittings shall be heavy weight, Schedule 40, of same manufacture as PVC pipe used.

F. NOTE: The first 24" of piping coming from pool heater shall be copper. Where the copper connects to PVC piping, after the 24", provide a copper to PVC transition connection.

G. Valves:

1. Small Valves (up to and including 2-1/2" in size): Gate valves, all brass with threaded ends for ferrous pipe, 125 lb. non-rising stem type.

2. Large valves (larger than 2-1/2"): Rubber lined, cast iron, water type butterfly valves. Valves shall be hand operated with cadmium plated ductile iron discs, stainless steel stems and pins, and Buna-N seats and rated for 125 psi.

3. Valve extension stems and keys: Provide as required to operate the system.

4. Pipe identification: Plastic tags for valves in filter room.

H. Pipe Joints:

1. Cement and thinners: Use for making solvent welded joints. Of type compatible with kind of piping used.

2. Teflon tape (.003" min thickness): Use on the male threads of threaded pipe joints.

I. Fillers and levelers: Provide instrumentation sensors and valves to automatically fill and maintain level of pool complete with wiring and controls.

J. Chemical feed and heater controls: Provide instrumentation sensors and valves to automatically feed chemicals and maintain temperature of pool complete with wiring and controls.

2.10 SCHEDULES OF POOL FITTINGS' LIGHTS AND EQUIPMENT ACCESSORIES

Description	**Manufacturer**	**Model Number**
A. Pool Fittings		
1. Floor Inlet	Frost	A-41014
2. Pool Wall Inlet	Swimquip	8429
3. Auto Water Level Control	Mar-Max	LTC 0024S
4. 1-1/2" Hydrostat Valve	Frost	A-41452
5. 1-1/2" Hydrostat Tube	Swimquip	7017-157
6. 1-1/2" Skimmer	American Prod	844201
7. 1" Fill Spout	Frost	A-41240
8. Pool Main Drain Sump	Swimquip	7017-0103
9. Pool Main Drain Grate	Swimquip	7010741
B. Underwater Lights: (Coordinate with Section 16510(26 51 00))		
1. 100W/300W/12V Light (Two)	Pac-Fab	PHL-301/PHL-300
2. Light Niche	Pac-Fab	425.4
C. Deck Fittings:		
1. Grab Rail, 1.90-1/2” OD x .065 Stainless Steel with smooth grip finish	S. R. Smith	
2. Deck Anchor	S. R. Smith	AS-100B
3. Escutcheon Plate	S. R. Smith	IEP-100
4. Ladder 3 tread 1.90” OD x .065” Stainless Steel with mirror finish. Provide every 75’ at perimeter	S. R. Smith	SRS 506
D. Maintenance Accessories:		
1. Vacuum Cleaner Head Swivel Wheel	Rainbow	Flex-A-Vacuum
2. Vacuum Hose Heavy Duty	Action/Haviland	1-1/2" x 35'
3. Vacuum Pole (Telescopic 8’ to 16’)	Rainbow	#812-16 (8'-16’)
4. Utility Pole	Frost	A40177-2
5. 18" Curved Wall Brush	A&B Brush	3000
	Spectrum	13210

6. Algae Brush	A&B Brush	2004
	Spectrum	13260/13270
7. Pole Adapter	Frost	A-41420 w/Brass Bolts & Wing Nuts
8. Deck Swab	Halogen Supply	48" CR Rubber
9. Brush Stabilizer	A&B Brush	Water Foil

E. Safety Accessories:

1. Life Buoy (24" Approx.)	Cal-June, Inc.	U.S.C.G.
2. Throw Line (60, min.) w/ Floating Ball	AJ Giammanco	#60"
3. Life Hook	Rainbow	#153 Double Arm (R221026/R221030
4. Life Hook Pole	Rainbow	820-16 (R191116)
5. Life Hook Pole Adapter	Frost	A-14420 w/Brass Bolts and Wing Nuts
6. Spine Board w/Ties		
7. 16 Unit First Aid Kit		

2.11 DECK DRAIN SYSTEM

A. Linear Deck Drain System.

1. Approved Manufacturers:
   a. “Deck-O-Drain”, W. R. Meadows, Pool Deck Construction Products (800-542-7665)
   b. “Deck Drain-A-Way System II”, Quaker Plastic Corporation (888-288-6644)
   c. “Drain Rite” Mortex Manufacturing (800-338-3255)
   d. Approved Substitution

2. Material:
   a. Heavy wall, bondable, non-corrosive PVC
   b. Provide all nailing clips, couplers and fittings, end adapters, clean-out plugs and protective tape over drain surface.
3. Size: +/- 1-1/2” x 3-1/4” high x min. 8 ft. lengths, Center Channel.
4. Color: As selected by Owner’s Representative from Manufacturer’s full color range.

2.12 HANDICAPPED LIFT

D. Handicapped Lift:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers:
   a. "Swim-Lift Model Gallatin WP400 - ADA Handicap Pool/Spa Lift"; Spectrum Products (800-791-8057)
   b. Approved substitution.

E. Hydraulic therapy self assisted power lift, ADA compliant, stainless steel frame with a capacity to support 400 pounds with the horizontal arm fully extended. Must be able to accommodate locations at pool.

F. Material: 300 Series stainless steel.

G. Provide lifter, anchor assemblies, and all other components required for a complete and operational installation. Provide sleeves in deck at pool.

2.14 UNDER-SLAB AND WALL / CEILING MOUNTED VAPOR RETARDER

A. Provide conforming products, complying with ASTM E1993, from one of the following manufacturers:
   1. W.R. Meadows, Inc., Hampshire, IL (800-342-5976).
   2. Reef Industries, (Griffolyn®), Houston TX (800-231-6074).

B. Below Slab Products: Maximum permeance factor of 0.02.
   1. W.R. Meadows "Premoulded Membrane Vapor Seal with Plasmatic Core" – 7-ply.
   2. Griffolyn "T-105" -- 7-ply

C. Wall/Ceiling Products:
   1. W.R. Meadows "Premoulded Membrane Vapor Seal with Plasmatic Core" – 7-ply.
   2. Griffolyn "T-105" – 7-ply

2.15 VAPOR RETARDER ACCESSORIES

A. Tapes:
   1. Joint Seals: Pressure sensitive tape produced by vapor retarder manufacturer and specifically designed for sealing joints of above and below grade vapor retarder sheets and terminations to wood, steel and concrete substrates. Perm rating of tape shall not be less than the membrane being sealed.
   2. Mounting Tape: Double-faced pressure sensitive tape produced or approved by vapor retarder manufacturer and suitable for mounting vapor retarder to wood framing.

B. Pipe Boots: Premoulded devices of same material as slab vapor retarder to facilitate sealing vapor retarder to penetrations. Sizes as needed for penetrations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas in which work is to be performed. Report in writing to Owner's Representative all prevailing conditions that will adversely affect satisfactory execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Starting work constitutes acceptance of the existing conditions and this Contractor shall then, at his expense, be responsible for correcting all unsatisfactory and defective work encountered.

3.02 PREPARATION

A. Perform earthwork and dewater excavation in compliance with Civil Drawings. Remove excess earth from site if required and as directed by the Owner's Representative.

B. Trench for system as specified on Civil Drawings and provide system as specified.

3.03 INSTALLATION

A. Vapor Retarders:
   1. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission.

2. Seal vertical and horizontal joints in vapor retarders over framing by lapping not less than manufacturer recommended widths. Attach vapor retarders to framing per manufacturer recommendations, at perimeter of wall openings, and at lap joints.

3. Seal overlapping joints in vapor retarders with adhesives per vapor retarder manufacturer's printed directions. Seal joints and fastener penetrations with tape of type recommended by vapor retarder manufacturer. Locate all joints over framing members or other solid substrates. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

4. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape of type recommended by vapor retarder manufacturer to create an air-tight seal between penetrating objects and vapor retarder.

5. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

B. Formwork and Reinforcement:

1. Install form work to lines and profiles shown. Brace forms for work to prevent movement during concrete placing operations.

   a. Allow other trades sufficient time for installation of equipment and materials which must be fastened to forms.

   b. Clean form surfaces prior to concrete placing operations.

2. Place reinforcing steel as shown on drawings. Steel shall be free from dirt' rust' oil, paint and mill scale.

3. Securely wire-tie steel at points where bars cross. Stagger splices and laps.

4. Install gauging wires to establish thickness of finish work.

5. After placing pool reinforcing, but before placing concrete, confirm that grounding circuits have been provided by the electrical contractor to steel reinforcement, grab rails, and hand rails, as required by the National Electrical Code, Article 680. No concrete shall be placed until this requirement has been complied with.

C. Concrete:

1. Placing of "Gunite" and shotcrete: Conform to the requirements of GCA publication G-84 and as specified herein.

2. Gunite:

   a. Mixing: Mix dry in batch mixing machine for a period of not less than 1 minute.

   b. Mix and strength: As specified in Part 2.

3. Shotcrete

   a. Mixing time: Mixing time for materials delivered by ready-mix trucks to job site, shall not exceed two hours or 250 revolutions of drum, whichever comes first. Additional water may be added at job site only if requested by Contractor. When additional water is added, rotate drum minimum of 30 additional revolutions.

4. Placing Concrete:

   a. Place concrete against original undisturbed soil, thoroughly compacted earth.

b. Remove all loose, fine aggregate or rebound from surfaces receiving concrete before placing succeeding layers. Whenever possible, first layer shall entirely cover reinforcing steel to secure it in proper position.

c. Where new concrete is applied against existing concrete, thoroughly clean the existing surface and drench with water at least twice on the day before placing new concrete. Surfaces upon which concrete will be applied shall be sufficiently damp to prevent excessive absorption of water content in new concrete mix, but not so wet as to overcome suction.

d. Concrete deposited on vertical surfaces shall be shot at right angle to surface starting at the bottom and continuing upward. Build up in layers of a thickness that will not slump, allowing sufficient time between placing of layers for initial set to take place.

5. Finishing:

a. When thickness and planes outlined by forms and gauging wires have been reached, rod surfaces to true lines. After rodding, remove gauging wires. Finish all exposed surfaces to straight and true lines.

b. Finish: Gun finish as left by nozzle.

6. Continuously moisture cure for no less than 7 days.

D. Equipment:

1. Flow meters: Install in straight run of pipe having minimum length of 10 pipe diameters upstream and 4 pipe diameters downstream and in position that can be easily read by operator.

2. Chemical Feed injection: Locate Injection points downstream from all filter room equipment.

E. Deck Drain System:

1. Install deck drain system in strict accordance with manufacturer recommendations and written instructions.

2. Grade subsoil, sloping it toward drain location. Drive 3-1/2” short stakes into ground at 30” o/c – two nailing strips per 10 ft. section. Attach nailing clips and place drain over the stakes. Use couplers to ensure a straight even line. After aligning, nail firmly to stakes.

3. Insert adapter. Install Clean-out. Place concrete and trowel gradual (min. ¼”/ft.) slope to drain. After concrete has set, install end plug.

4. Coordinate removal of protective tape with deck finish coating application.

F. Piping:

1. Cut all pipe with mechanical cutter without damage to pipe.

2. Placing and Laying: Inspect pipe for defects before installation. Clean the interior of pipe thoroughly of foreign matter and keep clean during laying operation. Pipe shall not be laid in water or when trench conditions are unacceptable as determined by the Owner's Representative. Water shall be kept out of the trench until the pipe is installed. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substance will enter the pipes or fittings.

3. Threaded Joints: After cutting and before threading the pipe shall be reamed and shall have burrs removed. Screw joints shall be made with graphite or inert filter and oil or with an approved graphite compound applied to male threads only. Threads shall be full-cut and not more than 3 threads on the pipe remain exposed. Use Teflon 11 tape on the

male threads of all threaded pipe joints. Caulking of threaded joints to stop or prevent leaks will not be permitted. Unions shall be provided where required for disconnection of exposed piping. Unions will be permitted where access is provided.

4. Solvent welded joints shall be made in accordance with the manufacturer's printed instructions and the following minimum standards:

   a. Fittings shall fit easily on the pipe before applying cement. The outer surface area of pipe and inner wall of fitting shall be dry and dean. Thinner is to be applied to the outer surface of the pipe and to the inner surface of the fitting. Cement is to be applied to the outer surface of the pipe, or on the male section of fittings only. When the outside surface area of the pipe is satisfactorily covered with cement allow ten (10) seconds open time to elapse before inserting pipe end into fitting. After full insertion of pipe into fitting, turn fitting about the pipe end approximately 1/8 to 1/4 of a turn. Wipe off excess cement at the joint in a neat cove bead.

   b. Joints shall remain undisturbed for a minimum of 10 minutes from time of jointing the pipe and fitting. If necessary to apply pressure to a newly made joint, limit to 10% of rated pipe pressure, during the first 24 hours after the joint has been made.

   c. Full working pressure shall not be applied until the joints have set for a period of 24 hours.

   d. Make provisions for expansion and contraction by way of swing joints or snaking.

   e. Protect plastic pipe from exposure to aromatic hydro-carbons, halogenated hydra carbons, and most of esters and ketones that attack the material. Protect all pipes from mechanical damage and long exposure to sunlight during storage.

5. Install piping without cross connections or inter-connection between distribution supply for drinking purposes and swimming pool that will permit backflow of water into potable water supply. Pipe openings shall be closed with caps or plugs during installation. Equipment and pool fittings shall be tightly covered and protected against dirt, water and chemical or mechanical injury. At completion of work fittings, materials and equipment shall be thoroughly clean and adjusted for proper operation.

6. Filter Face Piping: Arrange to carry out operations of filtering backwashing and filter draining.

7. Valve identification: Label all valves.

8. Testing and Flushing:

   a. Pressure Piping: After the pipe is laid, the joints completed, and the trench partially backfilled leaving joints exposed for examination, subject new lines to a hydrostatic pressure of not less than 50 pounds per square inch. Joints shall remain watertight under this pressure for a period of two hours.

   b. Gravity Lines: A water test shall be applied to all gravity drain piping system, either in their entirety or in sections. All openings shall be tightly plugged and each system filled with water and tested with at least a 10 foot head of water. Water shall be kept in the system or in the portion under tests for at least 15 minutes before inspection starts. System shall be tight at all joints.

   c. Flushing: Pipelines leading to the pool shall be thoroughly flushed clean with chlorinated water before the pool is filled and placed in use.

G. Plaster Finish:

1. Finish concrete surfaces in pool with a wood float finish to a smooth consistent finish acceptable to Owner Representative.

2. Fill uneven surfaces and depressions per manufacturer's recommendations.
3. Wash all pool surfaces thoroughly with dilute solution of muriatic acid and flush with fresh water to assure a clean surface free of loose materials, dust, and foreign matter.
4. Plaster installation:
   a. Apply in accordance with manufacturer's installation instructions.
   b. Do not apply plaster when rain is imminent or at temperatures below 60°F.
   c. Apply in two coats using the double-back method to obtain a total thickness of not less than 3/8" or more than ½". Use tile as screed.
5. Trowel to smooth, dense, impervious surface free of stains and uniform color consistency.
6. Fill pool as plaster work progresses.

H. Tile Installation: Where shown on Drawings, use setting materials and grout in accordance with Section 09 30 00.

3.04 FIELD QUALITY CONTROL

A. For Gunite and Shotcrete Work:
1. Compressive strength test: Take 1 sample for pool floor construction and 1 sample for wall construction but no less than a minimum test for each 50 cu. yd. of concrete.
2. Submit copy of test results to Owner's Representative.

B. Water Treatment
1. Obtain a chemical analysis of the source/make-up water supply and submit to Owner's Representative. Include the following:
   a. Total alkalinity/ppm
   b. Calcium hardness/ppm
   c. Chlorine/ppm
   d. pH
   e. Iron
   f. Copper
2. Treat and balance pool water prior to turnover of pool to Owner's Operations Division.
3. Balance water to establish:

Total alkalinity:	80-100 ppm
Calcium hardness:	20~275 ppm
Total Available CHL (Pool):	1.5 ppm
Free Available CHL (Pool:	1.5 ppm
Total Available CHL (Spa):	3.0 ppm
Free Available CHL (Spa):	3.0 ppm
pH:	7.4 - 7.6
Iron content:	0.0 ppm
Copper content:	0.0 ppm
Saturation Index	-.3- +.3

END OF SECTION

SECTION 14 21 23 - ELECTRIC TRACTION PASSENGER ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnish and install a complete new Electric Traction Machine-Room-Less (MRL) Elevator System including, but not limited to, the elevator cab, elevator entrances, motors and controls. The new elevator system shall be furnished and installed in complete accordance with the Specifications and Drawings.
2. Elevator #002 rear door lockout

B. Work Included in Other Sections:

1. General Contractor to provide the following:
    a. Confirm length, width, and clear overhead dimensions for hoistway, and provide size as required, as approved by Architect and elevator manufacturer.
    b. Provide all structural supports for guide rails and other mechanisms, as located by elevator manufacturer.
    c. Sill supports and grouting inside of hoistway for doors.
2. Telephone Cable by Division 27.
3. Electrical
    a. Include auxiliary contact in mainline electrical disconnect switch to signal elevator controller loss of power is shutoff of disconnect switch.

C. Related Sections:

1. Section 04 20 00 - Masonry Units
2. Section 05 12 00 - Structural Steel: Hoisting Beam
3. Section 05 50 00 - Metal Fabrications: Pit Ladders, Sump Pit Cover
4. Section 09 90 00 - Painting
5. Division 23 - Heating, Ventilation, and Air Conditioning
    a. Ventilation and temperature control of elevator equipment room.
6. Division 26 - Electrical
    a. Electrical service to main disconnect in elevator control room, electrical power for elevator installation and testing, electrical disconnecting device to elevator equipment prior to activation of sprinkler system, electrical service for control room, and pit receptacles with ground fault current protection, lighting in control room and pit, wiring for telephone service to control room.
7. Division 27 - Communications.
    a. Telephone Systems; ADAAG-required emergency communications equipment.
8. Division 28 - Fire Protection
    a. Fire and smoke detectors; fire alarm signal lines to contacts in the control room.

1.02 REFERENCES

A. "Americans with Disabilities Act Accessibility Guidelines "(ADAAG)

B. ANSI/ASME 17.1 "Safety Code for Elevators and Escalators"

C. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

D. ASTM A526 - Steel Sheet, Zinc-Coated, (Galvanized) by the Hot Dip Process, Commercial Quality.

E. ASTM B209 - Aluminum-Alloy Sheet and Plate

F. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Shapes, Tubes

G. PS-1 - Construction and Industrial Plywood

H. FS L-P-508 - Plastic Sheet, Laminated, Decorative, and Nondecorative

I. MIL-L-1914 - Lumber and Plywood, Fire-Retardant Treated

J. AWS D1.1 - Structural Welding Code

1.03 DEFINITIONS

A. Gearless Traction Elevator: Space-saving machine-room-less gearless traction elevators are designed for medium to high rise buildings having over 50 feet of travel, where quality performance, energy efficiency and high speeds are desired within a compact footprint.

B. Definitions in ASME A17.1 apply to work of this Section.

C. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.04 SYSTEM DESCRIPTION

A. The work of this Section includes new gearless, machine-room-less (MRL) traction passenger elevators to comply with the Americans with Disabilities Act (ADA).

B. Elevator characteristics are as follow:

1.	Quantity and Type	Two (2) Gearless Traction Passenger Elevators
2.	Capacity	1- 2500 Pound denoted as Elev 001 on drawings 1- 3500 Pound denoted as Elev 002 on drawings
3.	Speed	150 Feet per Minute
4.	Travel	Floor to floor varies with a total travel distance of 34'-0". Refer to Drawing A-532 for enlarged elevator plans and shaftway section. Elevator manufacturer to field verify finish floor to floor heights.
5.	Landings	Four (4)
6.	Openings	Number of Openings: Nine (9) Front: Eight (8) Rear: one (1) Provide ability to lockout rear door operation. Owner shall provided keycard activator or similar device.
7.	Operation	Duplex Selective Collective

8. Clear Car Inside Size:

2500 Pounds:	Nominal, Minimum 6’ 8-5/16” W x 4’ 3-5/32” D x 8'-0" H, and also in accordance with American with Disabilities Act (ADA)
3500 Pounds:	Nominal, Minimum 6’ 8-5/16” W x 5’ 5” D x 8'-0" H, and also in accordance with American with Disabilities Act (ADA)

9. Hoistway Entrances (Size) 3'-6" Wide x 7'-0" High
   (Type) Side Opening
   (Fire Rating) 1-1/2 HR
10. Power Supply 208 Volts, 3 Phase, 60 Hertz
11. Signals Illuminated car and hall buttons, car position indicator with audible signal, car direction sign with dual stroke gong, and as specified herein.
12. Additional Features Complete provisions for the handicapped, infrared screen type detector, emergency light, telephone, Voice announcing, and as specified herein.

1.05 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 with the following supporting data:

1. Submit Shop Drawings and product data that clearly indicate space requirements, general arrangement of elevator equipment, and material being supplied. Show connections, attachments, reinforcing, anchorage and location of exposed fastenings, and location and amount of loads and reactions to be carried on the building structure.
2. Submit descriptive brochures or detail Drawings of landing buttons, hall fixtures, car position indicators, and car operating panels, car interior, and hoistway doors and frames for review.
3. Samples of exposed finishes for car, hoistway doors and entrances, and operating and signal equipment; 3-inch square samples of sheet materials; and 4-inch lengths of running trim members.
4. Certification that a service office of the manufacturer is located within 50 miles of the Project and that a parts warehouse is located within 50 miles of the Project.
5. Submit repair parts catalogs, instruction manuals, and wiring diagrams specific to this project.
6. Record Documents: Refer to Section 01 78 23 - for required closeout documents to be provided at completion of Project.
   a. Maintenance manuals for each different traction elevator, including operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include all diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at project closeout as specified in Division 01.

B. Inspection and acceptance certificates and operating permits as required by governing authorities for normal, unrestricted elevator use.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Engage the elevator manufacturer or an experienced Installer approved by the elevator manufacturer who has completed a minimum of 5 years of experience with elevator installations similar in material, design, and extent to that indicated for this Project and a record of successful in-service performance.

B. Regulatory Requirements:

C. Regulatory Requirements:

1. Conform to:

a. The American Society of Mechanical Engineers (ASME) Publications:

1) A-17.1 “Safety Code for Elevators, and Escalators”

2) A-17.2 “Guide for Inspection of Elevators, Escalators, and Moving Walks”

b. American National Standards Institute (ANSI) Publications:

1) C1 “National Electric Code”

c. Local and State Codes

d. Americans with Disabilities Act (ADA) II Public Accommodations

1) “Americans with Disabilities Act Accessibility Guidelines “(ADAAG)

e. The Elevator Contractor shall obtain and pay for all required inspections and permits and perform tests as called for by regulations of governing authorities.

f. American Society of Civil Engineers (ASCE) Publications:

1) ASCE 7, "Minimum Design Loads for Buildings and Other Structures" for elevator design requirements for earthquake loads.

D. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

E. Proprietary Components

1. Processors or other equipment which can only be serviced by the manufacturer are prohibited, unless a non-expiring service/adjustment tool and instructions are provided to Owner at no additional cost. Provide onboard diagnostics on elevator controller.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver items or materials to site after area in which they are to be installed is ready to receive them in their place of final installation.

B. Store materials in allotted storage area, and in such a manner as to prevent deterioration, damage, or loss of their essential properties.

1. Fully protect movable and operating equipment from weather.

2. Wrap and create factory finished materials in manner to protect their finishes.

1.08 PROJECT CONDITIONS

A. Temporary Use of Elevators:

1. The elevator shall not be used for building construction purposes.

2. If Owner decides to use the elevators prior to completion of project, approval shall begin when elevators are accepted by Owner's Representative. Temporary use will not be considered final acceptance by the Owner or commencement of warranties.

B. Changes to Drawings and Specification:

1. Review shaft size, machine room size, pit and over-travel dimensions shown on the Drawings and state in a letter with the bid if changes are required to accommodate manufacturer's standard equipment.

2. Failure to furnish such statements will be interpreted to mean that this Contractor agrees to meet all requirements under this Section, and conflicts with the work of other trades will not result in added expense to Owner.

1.09 MAINTENANCE

A. Maintenance Service:

1. Provide a separate proposal for Owner's review and acceptance. The proposal shall maintain entire elevator installation for 12 months after date of Substantial Completion of Work. Use only competent and trained employees of the manufacturer. Provide 24-hour Emergency Call-Back Service during maintenance period.

2. Include systematic examination, adjustment, and lubrication of elevator equipment, repair, or replace worn electrical and mechanical parts of the elevator equipment using only genuine standard parts produced by manufacturer of equipment concerned.

3. Perform work without removing cars during peak traffic periods.

4. Ensure that competent personnel handle maintenance service. Maintain locally an adequate stock of parts for replacement or emergency purposes and have qualified personnel available at such places to ensure the fulfillment of this service without unreasonable loss of time.

5. Indicate amount included in the proposal for this maintenance service. If the proposal is acceptable to the Owner, the Owner may elect to pay in 12 equal monthly amounts over the period of service.

B. Maintenance Proposal:

1. Provide separate amount for maintenance of installed elevator work for a period of one year after termination of regular maintenance as required in the preceding Paragraph.

2. Proposal shall include stipulated sum for above stated time period with premiums due quarterly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. "EcoSpace"; Kone, Inc. (800-956-5663)

2. "Gen2"; Otis Elevator Co. (800-441-6847)

3. "400A"; Schindler Elevator Corp. (973-397-6500)

2.02 CAR ENCLOSURE

A. The elevator cab(s) shall meet the requirements of the ASME A-17.1 Elevator Code, and all Elevator Code Supplements issued to date, including Code restrictions pertaining to flame spread and smoke generation.

B. The car shall be manufacturer's standard car, with finishes as shown below:

1. Ceiling: Stainless Steel No. 4 Finish with 6 halogen downlights.
2. Front & Rear Door Return Walls: Stainless Steel No. 4 Finish
3. Rear and Side Walls: Plastic Laminate. Refer to Interior Finish Index.
4. Base: Refer to Interior Finish Index.
5. Car Doors: Stainless Steel No. 4 Finish.
6. Car Sills: Aluminum
7. Floor – Porcelain tile to be installed at site to match lobby floor tile.
8. Handrails: Rear wall only, Stainless Steel No. 4 Finish, Manufacturers standard 2” flat profile meeting ADA grasp requirements. Handrail shall be spaced 1-1/2" from the car wall at 32" above car floor.

C. Protective pads and hooks - for side and rear walls.

D. Lighting - The minimum illumination in the car shall be in accordance with the latest edition of ANSI/ASME A-17.1 Elevator Code.

E. Signage: Provide engraved sign "Do Not use Elevator in case of Fire - Use Stairs" within cab and beside elevator entrance on each floor. Provide engraved sign "Elevator not to be used by construction personnel" and "Elevator permit on file with manager" in cab.

F. License holder: Stainless steel in each elevator car to suit certificate issued. Design holder with non-visible tamper-proof fastenings.

G. Provide reinforced structure at ceiling in conformance with ASME A-17.1.

2.03 CAR FRAME AND PLATFORM

A. The car frame which supports the elevator platform and enclosure shall be made of structural steel members. Platform shall be manufacturer's standard with a suitable sub-floor and a finished floor of carpet by others. Underside of platform shall be properly fireproofed.

2.04 HOISTWAY ENTRANCES AND DOORS

A. Hoistway entrances of the hollow metal, horizontal sliding, side opening type shall be provided at each of the hoistway openings. Size shall be as indicated in Specification.

B. Fire Rating: Comply with NFPA 80 and Underwriter's Laboratories, Inc. (UL) label or other as accepted by governing authorities, for rating as indicated on Drawings.

C. Finish:

1. Entrance Frame Profile: Square Jamb
2. Entrance Frame Material and Finish: No. 4 Stainless Steel
3. Door Panels and Sight Guards: No. 4 Stainless Steel
4. Entrance Sills: Extruded Aluminum

D. Door Operator and Control

1. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.

2. The door operator shall be arranged so that, in case of interruption or failure of electric power from any cause, the doors can not be readily opened by hand from within the car, unless the car is within 18 inches of a landing. Emergency devices and keys for opening the doors from the landing shall be provided if allowed by the local codes.

3. The doors shall open automatically when the car is leveling at the respective landings, and shall close after a predetermined time interval or immediately on pressing a car button. A "Door Open" button shall be provided in the car, the momentary pressing of which shall reopen the doors and reset the time interval.

4. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

5. Infrared Door Reopening Device: Black, fully enclosed device. Full screen infrared matrix or multiple beams extending vertically along edge of each leading door panel to a minimum height of 7'-0" above finished floor. Device shall prevent doors from closing and reverse doors at normal opening speed if beams are obstructed while doors are closing, except during nudging operation. If device fails, provide for automatic shutdown of car at floor level with doors open.

6. Rear Door Lockout Device: On Elevator #002, provide the ability to lockout the rear door. This lockout device will be actuated by a keycard or similar device provided by the owner.

E. Door Hangers and Tracks:

1. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.

F. Hoistway Door Jamb Markings:

1. Floor designation shall be provided on both sides of each hoistway entrance door jamb, visible from within the car and the elevator lobby. Designations shall be Braille and Arabic, 2" high, raised .030" and located 60" above the floor. Include star indication at main egress floor.

2. At the elevator car that accommodates ambulance stretcher, provide international symbol for emergency medical services (Star of Life) placed inside on both sides of the hoistway door frame. The symbol shall not be less than 3-inches high.

2.05 Operation & controls

A. Microprocessor Elevator Logic Control: The operation shall be accomplished utilizing microprocessor computer logic control contained in a cabinet. The elevator control program shall be contained in nonvolatile, programmable, read only memory. Control shall be constructed such that future alterations in elevator operation may readily be made by altering the read only memory. Safety circuits shall be monitored and controlled by the programmable logic control with redundant protection.

B. Duplex Collective Operation: Using a microprocessor-based controller, the operation shall be automatic by means of the car and hall buttons. In the absence of system activity, one car can

be made to park at the pre-selected main landing. The other (free) car shall remain at the last landing served. Only one car shall respond to a hall call. If either car is removed from service, the other car shall immediately answer all hall calls, as well as its own car calls. Arrange system with one of the cars, the "parked" car, normally parked with doors closed at the Primary Floor and the other car, the "free" car, parked with doors closed at level of its last call. When both cars are parked, pressure on a corridor button at which either is parked will cause doors to open; when both cars are at the same level, only doors of "free" car will open; pressure on a car button of either car starts the car as soon as door interlock circuit is established; when a corridor button is pressed at any level where a car is not parked, the "free" car starts in answer to the call. When "free" car is traveling up, and an "UP" call is registered below it, the call starts the "parked" car, when the "free" car is traveling down, a "DOWN" call registered above it or any "UP" call starts the "parked" car. When the "parked" car starts to answer calls, it becomes the "free" car and the other car, upon completing its calls, returns to the Primary Floor and becomes the "parked" car. If a car, for any reason, fails to start within a predetermined time (30 seconds) in answer to a call, the other car starts to answer the call.

C. Stops:
   1. Stops shall be made in the natural order of levels for each direction of travel irrespective of the order in which the calls were registered.
   2. Only the first car to approach a level in the proper direction shall stop in response to any one call. A car or hall call for the next direction of travel of the car shall be cancelled as the other car begins to slow down in response to the call and be held cancelled until the doors are closed preparatory to the car leaving the level. A hall call registered after the doors are closed shall remain registered to be served by the next car traveling in the proper direction.
   3. After each stop is made, the doors shall be closed and the car shall be restarted until all registered calls are cancelled.

D. Emergency Stop Switch: An emergency stop switch shall be provided in the car, in the pit, and on top of the car as required by ANSI A-17.1, designed to cut off current supply to motor and down direction valves and bring the car to rest independent of the regular operating devices.

E. Car Operating Panel: A flush-mounted operating panel shall be furnished in the car containing registration push buttons for each floor, alarm button, door open and close push buttons, light switch, independent service switch.

   1. Each car registration button shall illuminate when pressed, signaling that the car has been registered. Each button will remain illuminated until the call has been answered.

   2. Tactile car control symbols shall be placed adjacent to the emergency stop switch, door open, door close, alarm bell, and all call registration buttons.

   3. The car operating panel shall be mounted at Code required handicap levels.

F. Emergency Communication System: Provide hands-free audio Telephone ("Push to Talk") system conforming to ADA recommendations and shall automatically dial preprogrammed number as directed by Owner's Representative.

   1. Include automatic dialing (minimum rollover for 2 numbers), tracking and recall features with shielded wiring between the car and controller in the machine room (Cable by Div. 27).

   2. Use alarm button or separate button for the "Push to Talk" control.

   3. Button or adjacent light jewel shall illuminate and flash when call is acknowledged. Button shall match floor pushbutton design. Provide uppercase "Push to Call", "Help on the Way" engraved signage Sans Serif or simple Serif type.

   4. Provide Braille, "Telephone" and tactile symbol engraved signage adjacent to button.

5. System shall be included as part of the car station faceplate and shall include instructions for use, and battery back-up power supply.

G. Emergency Light: A battery powered emergency light shall be provided in the elevator car.

H. Car Position Indicator: A digital electric position indicator shall be provided in the elevator car. The position of the car and the hoistway shall be indicated by the illumination of the numeral corresponding to the floor at which the elevator is stopped or passing. An audible signal shall sound to indicate the car is stopping at or passing a floor.

1. Provide similar position indicator at the first floor landing, or primary egress floor, only.

I. Car Direction Signs: A car direction sign with visual and audible signal shall be provided in the car jamb, located 6'-0" above the car floor. The car direction sign shall be visible from the proximity of the hall push button fixture to indicate to the waiting passenger the direction the car will gravel. One car direction signs shall be provided for each elevator car entrance. Finish to be #4 Stainless Steel.

1. The visual signal lens size shall be at least 2-1/2" in the smallest dimension. The audible signal shall sound once for the up direction and twice for the down direction.

J. Hall Push Buttons: A hall push button station shall be provided for each elevator landing, containing a single push button at the terminal landings and two push buttons at the intermediate landings. Each push button shall illuminate when a call is registered, and shall extinguish when the call is answered. The hall push button fixture shall be mounted at the handicapped required height. Finish to be #4 Stainless Steel.

K. Fire Emergency Service: Provide in conformance with ASME A-17.1

L. Battery Standby Power Transfer (Emergency Return Unit): Upon loss of normal power, provide controls to automatically lower the car(s) nonstop to the lowest landing. Upon arrival at the lowest landing, the elevator doors shall open automatically and remain open until regular door time has expired. The elevator shall then become deactivated. The standby power source shall be provided via 12-volt D.C. battery units installed in machine room, including solid-state charger and testing means mounted in a common metal container. Battery to be rechargeable lead acid or nickel cadmium with a 10-year life expectancy.

1. Upon restoration of normal power, the elevator shall automatically resume normal operation.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine work of other Sections on which the work of this Section depends. Report defects to Owner's representative in writing which may affect work of this Section or equipment operation.

1. Review shaft size, control room size, pit and over-travel dimensions shown on the Drawings and report in writing if changes are required to accommodate manufacturer's standard equipment.

2. Failure to furnish such statements will be interpreted to mean that this Contractor agrees to meet all requirements under this Section, and conflicts with the work of other trades will not result in added expense to Owner.

B. Ensure that shafts and openings for moving equipment are plumb, level, and in-line and that pit is to proper depth with ladder.

C. Ensure that Control Room is properly illuminated, heated, and ventilated and equipment foundations correctly located, complete with floor and access door.

3.02 PREPARATION

A. Before fabrication of controls, take necessary job site measurements and verify where work is governed by other Sections. Check measurement of space for equipment and means of access for installation and operation. Obtain dimensions from site for preparation of Shop Drawings.

B. Ensure the following preparatory work, provided under other Sections has been properly completed to receive the elevator work:

1. Supply of electric feeder wires to the terminals of the elevator control panel, including fused main line switch or circuit breaker. Provision of hoistway outlets for car light, and for light in pit and outlets in machine room for light. Furnishing of electric power for testing and adjusting elevator equipment.

2. Provision of hoistway outlet for telephone.

3. Supply of power for emergency cab lighting and ventilation from power panel specified in Division 26 and fed by the building emergency circuits.

4. Machine room enclosed and protected from moisture, with lockable door.

C. Supply in ample time for installation, inserts, anchors, pipe sleeves, bearing plates, brackets, supports and bracing including setting templates and diagrams for placement.

3.03 INSTALLATION

A. Perform work with competent mechanics skilled in this work and under the direct control and supervision of the elevator manufacturer's experienced foreman.

B. Set hoistway entrances in alignment with car openings and true with plumb sill lines.

C. Install machinery, guides, controls, car, and equipment and accessories in accordance with manufacturer's instructions, applicable codes, and standards to provide a quiet, smoothly operating installation, free from sideway, oscillation, or vibration.

D. Mount machine immediately adjacent to hoistway on concrete foundation. Isolate and dampen machine vibration with properly sized sound-reducing anti-vibration pads.

E. Install and hook-up piping between machine and cylinder.

3.04 FIELD QUALITY CONTROL

A. Obtain and pay for inspections and permits and make such tests as are required by regulations of authorities. Make tests in presence of Owner's Representative.

B. Final inspection shall be after elevator installation, hoisting enclosure, and machine room are complete.

C. Inspect installation in accordance with ASME A-17.2.

D. Deliver test certificates and permits to Owner.

3.05 ADJUSTING AND CLEANING

A. Make necessary adjustments of equipment to ensure elevator operates smoothly and accurately.

B. Prior to final acceptance, remove protection from exposed surfaces and clean and polish surfaces with due regard to type of material.

C. At completion of work of this Section, except for special tools and diagnostic equipment, remove tools, equipment and surplus materials from site.

3.06 TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

1. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining system.

END OF SECTION

Revision Log

SECTION 14 91 33 - LAUNDRY AND LINEN CHUTES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Linen (laundry) Chutes

B. Related Documents:

1. Marriott's Fire Protection and Life Safety Design Standards (Module 14).

C. Related Sections:

1. Section 07 62 00 - Flashing and Sheet Metal
2. Section 21 10 00 - Fire Suppression
3. Division 22 and 26: Hook-ups for water and electrical services.

1.02 REFERENCE STANDARDS

A. NFPA Code: Comply with applicable portions of National Fire Protection Association (NFPA) No. 82.

1.03 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this project.
2. Product Data: Submit manufacturer's product specifications, standard details, installation instructions and general recommendations for total pre-engineered chute system. Mark-up data sheets to indicate actual selections for sizes and other details of installation.
3. Shop Drawings: Submit 1/4" scale section/elevation drawing, 1/2" scale typical landing plans, and 1-1/2" scale details of chute fabrication. Distinguish between factory fabrication and field assembly work. Show required piping, wiring connections and conduit runs for wiring.
4. Quality Control Submittals:

a. Test Reports: Fire rating, in duplicate.

1.04 QUALITY ASSURANCE

A. Reference Standards: Applicable requirements of standards and specifications referenced herein apply to the Work of this Section.

B. Chute and Accessories: Conform to NEPA, UL and Local Code requirements.

C. Sprinklers: Comply with requirements of NFPA 13, Section 4-4.9 and NFPA 82, Section 4-4.1.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to job site in unopened containers bearing manufacturer's name and content identification.

B. Store materials as recommended by the manufacturer.

1.06 PROJECT CONDITIONS

A. Coordination: Coordinate this Work with the Work of other Sections to avoid any delay or interference with other Work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Wilkinson-Hi-Rise, LLC. (800-231-3888)
2. Midland Chutes (847-678-4007)
3. US Chutes Corp. (800-872-4883)
4. Chutes International (800-882-4883)

2.02 LINEN CHUTE

A. Chute Sections: 16 gage aluminized steel per NFPA 82, 24" diameter.

1. Factory assemble sections to greatest extent possible. Disassemble only as necessary for shipping and handling limitations. Clearly mark for reassembly and coordinated installation.
2. Design sections to flash inside sections below, with no bolts, clips or other projections inside chute to snag flow of materials.
3. Except for joints required for shipment and installation, provide factory welded or lock-seamed tight joints.
4. Provide expansion joint in chute between supporting grid floor frames.

B. Vent: Extend full diameter chute section through roof; terminate top 4'-0" above roof. Equip 16 gage aluminized steel vent cap with ventilation air space around full diameter of vent riser, insect screen, condensation gutter, roof flashing. Provide roof curb at low slope roofs, installed by roofing contractor.

C. Door Units:

1. UL Labeled Door Units: Provide UL 1-1/2 hour labeled door units with 30-minute temperature rise of 250 deg. F., (139 deg. C.), complete with closers.
2. Chute Intake Door/Frame Units: Provide self-closing units at each landing and at heights above floor as indicated. Use manufacturer's recommended heights if not otherwise shown. Provide 21 inch x 18 inch door size. Equip doors with positive latch, latch handle, and manufacturer's standard keyed cylinder locks. Key outside locks and unlocks door. Provide manufacturer's standard stainless steel door units, AISI Type 302/304 with standard satin finish or No. 3 directional polish.
    a. Factory Bolt Doors to Intake Throat.
3. Discharge Hopper: Horizontal rolling, UL 1-1/2 hour labeled, spring counterbalanced with fusible link. Provided with required offsets and reinforcing, structural angle door around discharged opening, 2" IPS drain at low point of hopper, pipe pedestal support, 28" wide x 36" high x 14 gage stainless steel hopper door, manufacturer's standard self-latching devices.
4. Accessories:

Note: Coordinate with Requirements of Marriott's Fire Protection and Life Safety Design Standards (Module 14) and Section 21 10 00.

a. Flushing Spray Head: 3/4" IPS; installed above top intake door.

b. Sprinkler Heads: 1/2 IPS; located at or above top service opening of chute, at alternate floor levels in buildings over two stories in height, and at lowest service area, unless otherwise required by local code.

1) Recess heads out of chute area through which linen travels, with recessed area designed to avoid collection of foreign matter.

c. Offsets (bends) in the chute, if required, shall be made the same diameter as the chute of 16 gage aluminized steel and have an additional layer of 13 gage aluminized steel reinforcing the impact area. Offsets are not to deviate more than 15 degrees off the vertical axis of the chute.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas in which Work is to be performed. Report in writing, to Owner's Representative, all prevailing conditions that will adversely affect satisfactory execution of Work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Starting Work constitutes acceptance of the existing conditions and this Contractor shall then, at their expense, be responsible for correcting all unsatisfactory and defective Work encountered.

3.02 INSTALLATION

A. General: Comply with chute manufacturer's instructions and recommendations. Assemble components with tight, non-leaking joints and anchor securely to supporting structure with sufficient anchorages to withstand impact and wind loading stresses on vent units. Provide for thermal expansion movement of chute sections. Except as otherwise indicated, install chutes plumb, without offsets of obstructions, for free fall of materials within chutes. Install chute systems complete with doors, and with safety and fire-resistive components and accessories.

B. Intake and Discharge Doors: Install doors at heights and locations indicated. Provide anchorages, wall/chute interfaces, self-closing operation, self-latching and similar features of installation to comply with labeling and fire-resistive requirements for fire-resistive door construction. Interface door units with throat sections of chutes in a manner which will ensure safe, snag-proof, sanitary depositing of materials in chutes by users.

1. Coordinate foot-pedal door operator installation with door and enclosure wall installation.

3.03 TESTING, ADJUSTING, CLEANING

A. Test operate components of chute system upon completion of installation; demonstrate use and safety features to Owner's personnel. Operate doors, locks and interlock system to demonstrate that hardware is adjusted and electrical wiring is connected correctly. Where possible, complete test operations prior to installation of shaft enclosures.

B. Cleaning: Following completion of enclosure walls and ceilings, clean exposed surfaces of finished metal components of chute system. Remove foreign substances and repair imperfections in finishes, but do not remove UL labels.

3.04 DEMONSTRATION

A. Arrange demonstration of system operation, conducted by manufacturer's representative, to Owner's maintenance personnel

END OF SECTION

FIRE PROTECTION SPECIFICATIONS - INDEX

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SECTION 21 00 00 - FIRE SUPPRESSION – GENERAL

PART 1 GENERAL

1.01 REFERENCES

A. Sections 21 11 00 through 21 31 13 (as included), cover Fire Protection work specifically.

B. Refer to Sections 21 00 00 through 21 06 00 (as included), for items of general nature which apply to this portion of work.

C. Applicable construction codes, standards and guidelines for all Fire Protection Contract elements, including but not limited to the following:

1. State of Pennsylvania Building Code, including Fire Protection portions thereof.

2. Local Fire Department.

3. Local Fire Marshall's Office.

5. NFPA pamphlet no. 13, INSTALLATION OF SPRINKLER SYSTEMS.

6. NFPA pamphlet no. 70, NATIONAL ELECTRIC CODE.

7. NFPA pamphlet no. 72, NATIONAL FIRE ALARM CODE.

8. City of Latrobe Division of Water the water utility provider.

9. American National Standards Institute (ANSI) standards for materials and construction.

10. American Society of Mechanical Engineers (ASME) standards for materials and construction.

11. American Society for Testing and Materials (ASTM) standards for materials, construction and testing.

12. American Water Works Association (AWWA) standards for materials and construction.

13. Underwriter's Laboratories (UL) standards for materials and construction.

14. Factory Mutual (FM) standards for materials and construction.

15. The manufacturer's installation guidelines and recommendations for individual items and/or systems indicated herein.

16. The Owner's insurance underwriter's material and installation guidelines and/or standards.

1.02 SCOPE

A. The Fire Protection Contractor shall furnish all labor, materials, tools, incidentals and details necessary to provide a complete system of Fire Protection work as herein specified, as shown on plans, and as indicated or required by work under separate

contract included with complete project documentation. Coordinate installation and interface requirements with the appropriate contractors in advance.

B. The Fire Protection Contractor is responsible for satisfactorily addressing all review and inspection authorities requirements and directives in regard to methods of installation necessary for final approval.

C. The edition of all applicable NFPA Pamphlet's as recognized and amended by the Building Code Inspection/Approval Authority shall be the minimum requirement for all materials and methods. Unless indicated otherwise, and as a quality standard only, all materials shall be listed by Underwriter's Laboratories, Inc., and Factory Mutual Laboratories as approved for fire protection installations, when such is available.

D. Fire protection sprinkler installation to be as required to provide "fully sprinkled" protection/coverage for the entire structure.

E. In brief, the Scope of the Work shall include, but is not limited to the following:

1. Connection to new Fire Protection Water service at 5’-0” beyond perimeter of building at location shown on plans.
2. Automatic Sprinkler Systems throughout the new structure.
3. Alarm valves; flow, pressure and tamper switches; and other alarm initiating devices.
4. Layout Drawings, including all required design calculations and flow tests.

F. Wiring:

1. Unless indicated otherwise, all internal operation wiring incidental to the fire protection system shall be the responsibility of the Fire Protection Contractor, except wiring indicated by the Electrical Contract Documentation shall be by the Electrical Contractor. Electrical contract work includes external power input wiring to Fire Protection contract items, and wiring for flow alarms, supervisory switches, and any other alarm initiating or supervisory devices to and from the central fire alarm panel provided in the Electrical Contract.

2. All wiring (if any) in the Fire Protection contract, including low voltage, shall be installed in conduit. All wiring, conduit and installation shall be in accordance with the National Electrical and Fire Alarm Codes, and the requirements of Division 16, Electrical Specification.

3. The Fire Protection Contractor shall coordinate with the Electrical Contractor as required for proper installation and operation of items wired by the Electrical Contractor. This includes providing the locations of all devices to be wired to the Electrical Contractor at the first opportunity, and coordinating the voltage and any other electrical requirements for all devices.

G. The Fire Protection Contractor shall not submit or bid the sprinkler system as a gridded type system.

H. This Contractor to be licensed by the State of Pennsylvania for installation and service of fire protection systems, including alarm, detection, control and extinguishing components as indicated herein.

I. Failure on the part of the Fire Protection Contractor to fulfill the above requirements will not relieve him of the responsibility of executing all work necessary for a complete and approved installation without extra expense to the Owner.

1.03 PERMITS AND FEES

A. Unless directed otherwise by the General Conditions portion of project documentation, the Fire Protection Contractor shall apply for and pay any review, inspection, permit, license, testing and/or other service fees required by all review/inspection/approval authorities in connection with the work under this Contract.

B. Unless directed otherwise by the General Conditions portion of project documentation, the Fire Protection Contractor shall apply for and pay any procurement, tap, capacity, metering, testing and/or other service fees required by the Water Service Utility Provider in connection with the work under this Contract. This shall include procurement, execution and return of any forms and/or applications required; and participation in an initial design/installation consultation with the provider if required.

C. The Fire Protection Contractor shall include in his Bid the cost for flow test information and hydraulic calculations required for design and approvals. The flow test is to be arranged with the Water Authority, the Local Fire Department and the Owner's Insuring Agency in advance to allow observation and supervision.

1.04 DESIGN

A. The Contractor is required to read the Specifications covering all branches of the work and will be held responsible for coordination of his work with work performed under all other Contracts.

B. Sprinkler systems shall be designed, sized hydraulically and installed according to NFPA Pamphlet No. 13, and the rules and regulations of all review, inspection and approval authorities (required for final approval). See Plans for specific design information, including zoning, flow and density, allowances and head spacing.

C. If the Contractor has any questions concerning the Plans and Specifications, he is to feel free to contact the Engineer for clarification before Bids, and to fully understand the extent and responsibilities of his work.

D. Unless indicated otherwise at specific areas and/or locations, location of all sprinkler heads shall be determined by the Fire Protection Contractor, as required for protection specified, and final approval.

E. The Fire Protection Contractor is responsible for locating all sprinkler heads in one of the optional ceiling tile installation points as detailed on drawings for gridded lay-in ceilings.

F. Location of sprinkler heads by the Fire Protection Contractor is subject to approval by the Architect in review of the "Preliminary" Plans Submittal specified herein. The Architect reserves the right to relocate heads during this review, providing sprinkler protection is not compromised, and no conflicts occur with NFPA or inspection/approval authorities requirements as a result of relocations.

1.05 FIRE PROTECTION SUPPLEMENTAL INFORMATION

A. Water Source and Supply:

1. Connection to existing underground public utility water main by Site Contract at site location indicated on plans.

B. Building Information:

1. See Architectural Documentation for detailed building code, occupancy classification(s) and construction information.

2. See complete Architectural documentation, including plans, elevations, sections and details for additional information affecting fire protection work.

C. Refer to plans for Flow Test Information. Note that this information does not rescind the Fire Protection Contractor's requirement to arrange a new flow test as specified herein, unless existing test information is acceptable to the review/inspection/approval authorities for fire protection design.

1.06 TESTING AND INSPECTION

A. Testing:

1. Sprinkler Installation: The testing of the sprinkler installation shall conform to the applicable provisions of NFPA Pamphlet No. 13.

2. Underground Installation: The testing and flushing of the underground installation shall conform to the applicable provisions of NFPA Pamphlet No. 24.

3. Upon completion, and prior to the acceptance of the installation, the Contractor shall furnish the Owner with four (4) copies of the certification required. Testing of all piping for the Fire Protection system is to be made in accordance with the National Fire Protection Association and in the presence of a representative of the Owner and Insurance Company. As a minimum, a copy of "Contractors Certificate of Materials and Tests" properly executed and verifying satisfactory tests shall be furnished to the Owner upon completion of the tests.

B. Inspection: When all work has been completed, the Contractor shall conduct a preliminary but complete inspection and testing of the installation. The system, as a whole, and all component parts thereof, shall receive all inspections and tests necessary to assure that the materials, equipment, devices and all functional operations meet the requirements of this specification and standards referenced herein.

C. The Architect shall be notified of all scheduled tests at least 48 hours in advance so that he may witness same. If the Contractor performs any test or adjustment without the Architect present or without properly notifying the Architect, the Contractor will be required to perform the test or adjustment a second time in the presence of the Architect.

1.07 COORDINATION

A. All work shall be done in a neat and workmanlike manner and this Contractor shall coordinate his work with all other Contractors on the project to ensure that his work does not interfere with the proper installation of work by other trades.

1.08 FIRE PROTECTION PLANS AND CALCULATIONS

A. Prepare plans and calculations for review and approval by the Architect, the Insuring Agency and the review/inspection/approval authorities. Documentation (including plans and calculations) to be as specified in NFPA Pamphlet No. 13.

B. Submit four (4) sets of plans and calculations to the Architect for "Preliminary" review. The Fire Protection Contractor shall address all comments generated by this review to the satisfaction of the Architect, prior to submittal to the inspection/approval authorities.

C. Submit three (3) sets of plans and calculations to the Insurer for "Preliminary" review. The Fire Protection Contractor shall address all comments generated by this review to the satisfaction of the insurer, prior to submittal to the inspection/approval authorities.

D. After plans and calculations have been reviewed and approved for construction by the review/inspection/approval authorities, provide four (4) sets of the documentation with all required stamps and approvals to the Architect for "Final" review and record.

E. If applicable, wiring diagrams for all items included in the fire protection system shall be submitted for review, along with equipment submittals, plans and calculations. This includes manufacturer's standard diagrams for pre-wired items/elements such as tamper and flow switches, as well as any custom configured items/elements such as detection/control panels.

1.09 SUPERVISION

A. This Contractor shall have in charge of the work, on the job as required, during construction, a competent superintendent experienced in the work installed under this Contract.

1.10 GUARANTEE

A. This Contractor is responsible for all defects, repairs and replacements in materials and workmanship, for a period of one (1) year after final payment is approved by the Architect/Engineer/Owner's Representative.

PART 2 PRODUCTS

2.01 Where items are indicated herein to be listed/approved, the intent of this specification is that said item shall be listed by all applicable material/construction standards, and subject to final approval (including methods of installation) by all review/inspection/approval authorities.

2.02 Unless indicated otherwise, all Fire Protection Contract items (pipe, fittings, valves, specialties, fixtures, equipment, etc.) materials, construction, performance, testing and methods of installation to be as listed/approved by all applicable material/construction/installation standards for same, and be in accordance with the requirements of all review/inspection/approval authorities. This includes, but is not limited to, the standards and authorities referenced in this specification. In the absence of such standards and/or requirements, the item/element manufacturer's recommendations, as confirmed by the Fire Protection Contractor in advance, shall be followed.

2.03 All Fire Protection Contract items shall have the manufacturer's mark or name and the quality of the product or identification of same cast, embossed, stamped or indelibly marked on each item/element in accordance with the standards under which they are accepted and approved per applicable code(s).

2.04 Unless indicated otherwise, all Fire Protection piping shall be in accordance with the following standards in regard to materials, construction, dimensions/tolerances and methods of installation

(as applicable), and shall be so listed. Final approval for use is subject ot the requirements of the review and inspection authorities:

A. Steel pipe, malleable and cast iron fittings and joining methods; per applicable ASTM/ANSI/ASME standards.

B. Ductile iron pipe, fittings and joining methods; per applicable ASTM/ANSI/ASME/AWWA standards. In addition, where combination fire protection and domestic water service is utilized, all elements shall be per applicable NSF standards.

C. Plastic pipe, fittings and joining methods; per applicable ASTM/ANSI/ASME/AWWA standards. In addition, where combination fire protection and domestic water service is utilized, all elements shall be per applicable NSF standards.

PART 3 EXECUTION

3.01 Where standards, codes or guidelines are referenced herein and throughout the Fire Protection Contract documentation, including plans and specifications, the latest version/edition shall be applied, unless the Building Code references another version/edition, which shall take precedence.

3.02 Refer to project documentation furnished with the complete construction package in advance of work for overall coordination and verification of requirements at work of other trades relating to, interfacing with, and/or impacting work in the Fire Protection Contract. This includes exact locations, quantities, physical sizes, rough-in details, pipe routing, connection sizes, etc., for items included both in the Fire Protection Contract and under separate contract. Coordinate installation and interface requirements with the appropriate contractor(s) in advance of work.

3.03 Include any minor details, items essential to necessary approvals and successful operation in addition to the items specified herein and shown on plans.

3.04 Where existing items are indicated to be reused as a part of new work, the Fire Protection Contractor is responsible for action required to assure that such items will function properly in the completed revised setting, and be in compliance with the requirements of the review, inspection and approval authorities. This includes removal, cleaning and/or reconditioning of items if required.

3.05 See general "FIRE PROTECTION NOTES" on plans for additional conditions and requirements relative to the Fire Protection Contract.

3.06 Fire Protection items shall be installed with due regard to preservation of the strength of structural members and prevention of damage to walls, surfaces and other structures through installation, bearing support or subsequent usage of Fire Protection items and elements. No framing or other support structure shall be cut, notched or bored in excess of limitations specified in the Building Code, or by the manufacturer of the framing or other support structure, as confirmed in advance of work by the Fire Protection Contractor.

END OF SECTION 21 00 00

SECTION 21 05 00 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Piping Materials and Fittings
2. Joining Materials
3. Dielectric Fittings
4. Mechanical Sleeve Seals
5. Piping Specialties
6. Piping Installation
7. Equipment Installation
8. Concrete Bases.
9. Erection of Metal Supports
10. Erection of Wood Supports
11. Cutting and Patching
12. Grouting

B. Related Documents:

1. Marriott's Fire Protection and Life Safety Design Standards (Module 14):

a. Marriott's Fire Protection and Life Safety Design Standards apply to all Marriott International Brands as well as Owned, Managed and Franchised properties.

b. Marriott's Fire Protection and Life Safety Design Standards include Design Standards, performance criteria, reference standards and life safety process verification that define a comprehensive fire protection program.

C. Related Sections:

1. Section 21 10 00 – Fire Suppression Systems

1.02 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.

2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PVC: Polyvinyl chloride plastic.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections:

1. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.
2. Coordination Drawings: Detail major elements, components, and systems of fire suppression equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:
   a. Planned piping layout, including valve and specialty locations and valve-stem movement.
   b. Clearances for installing and maintaining installation.
   c. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
   d. Equipment and accessory service connections and support details.
   e. Exterior wall and foundation penetrations.
   f. Fire-rated wall and floor penetrations.
   g. Sizes and location of required concrete pads and bases.
   h. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
   i. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
   j. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, and other ceiling-mounted items.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.05 SEQUENCING AND SCHEDULING

A. Coordinate fire suppression equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for fire suppression installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of fire suppression materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate requirements for access panels and doors if fire suppression items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Section 08 31 00 - "Access Doors and Panels."

F. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

1.06 Posted Operating Instructions

A. Provide and post operating instructions for all fire suppression systems.

PART 2 PRODUCTS

2.01 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B32.

1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.

2. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.

3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10 percent maximum lead content.

4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10 percent maximum lead content.

5. Alloy Sb5: 95 percent tin and 5 percent antimony, with 0.20 percent maximum lead content.

F. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.

2. BAg1: Silver alloy.

3. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements: Manufacturer's standard solvent cements for the following:

1. ABS Piping: ASTM D2235.

2. CPVC Piping: ASTM F493.

3. PVC Piping: ASTM D2564. Include primer according to ASTM F656.

4. PVC to ABS Piping Transition: ASTM D3138.

H. Plastic Pipe Seals: ASTM F477, elastomeric gasket.

I. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

J. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

1. Sleeve: ASTM A126, Class B, gray iron.
2. Followers: ASTM A47 malleable iron or ASTM A536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.02 DIELECTRIC FITTINGS

A. Approved Manufacturers:

1. Anvil International, Inc., a Subsidiary of Mueller Water Products, Inc. (603-422-8000)
2. Central Plastics Co. (800-654-3872)
3. Grinnell Mechanical Products, A Tyco International Company (800-500-4768)
4. Perfection Corporation (800-544-6344)
5. Mueller Industries, Inc. (800-348-8464)
6. Victaulic Co. of America (800-742-5842)
7. Watts Water Technologies, Inc. (978-688-1811)
8. Zurn Plumbing Products Group of Jacuzzi Brands, Inc. (805-238-7100)

B. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

C. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

D. Insulating Material: Suitable for system fluid, pressure, and temperature.

E. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

F. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150-psig minimum working pressure as required to suit system pressures.

G. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Provide separate companion flanges and steel bolts and nuts for 150-psig minimum working pressure as required to suit system pressures.

H. Dielectric Couplings: Galvanized-steel coupling with inert and non-corrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

2.03 MECHANICAL SLEEVE SEALS

A. Approved Manufacturers:

a. Metraflex Inc. (800-621-4347)
b. PSI-Thunderline/Link-Seal (800-423-2410)

B. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.04 PIPING SPECIALTIES

A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.

2. Steel Pipe: ASTM A53, Type E, Grade A, Schedule 40, galvanized, plain ends.

3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

a. Underdeck Clamp: Clamping ring with set screws.

B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.

1. ID: Closely fit around pipe, tube, and insulation of insulated piping.

2. OD: Completely cover opening.

3. Cast Brass: Split casting, with concealed hinge and set screw.

a. Finish: Polished chrome-plate.

4. Cast-Iron Floor Plate: One-piece casting.

2.05 GROUT

A. Non-shrink, Nonmetallic Grout: ASTM C1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, non-staining, non-corrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psig, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

PART 3 EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping as described below, unless piping Sections specifies otherwise. Individual Division 21 piping Sections specifies unique piping installation requirements.

B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings as required by Division 01 Sections and as outlined in Part 1 of this section.

C. Install piping at indicated slope.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

I. Install piping to allow application of insulation plus 1-inch clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's written instructions.

M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish.
2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
4. Insulated Piping: Cast brass with concealed hinge, set screws, and chrome-plated finish.
5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

N. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping rings where required.
2. Build sleeves into walls and slabs as work progresses.
3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS (DN150).
    b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS (DN150) and larger, penetrating gypsum-board partitions.
4. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Refer to Section 07 62 00 "Sheet Metal Flashing and Trim" for flashing.
    a. Seal space outside of sleeve fittings with non-shrink, nonmetallic grout.
5. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealant. Refer to Section 07 92 00 "Joint Sealants" for materials.
6. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

O. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.

3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

P. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire stopping materials. Refer to Section 07 84 00 - "Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

T. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

3. Soldered Joints: Construct joints according to CDA's "Copper Tube Handbook."

4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.

c. Align threads at point of assembly.

d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.

e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.

7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:

a. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.

b. CPVC Piping: ASTM D2846 and ASTM F493.

c. PVC Pressure Piping: ASTM D2672.

d. PVC Non-pressure Piping: ASTM D2855.

9. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657 procedures and manufacturer's written instructions.

a. Plain-End Pipe and Fittings: Use butt fusion.

b. Plain-End Pipe and Socket Fittings: Use socket fusion.

U. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.

2. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.02 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights is not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Owner’s Representative.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install fire suppression equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope as specified in other Division 21 sections.

F. Clearance from Electrical Equipment: Wet piping is prohibited in electric rooms and closets, elevator machine rooms and installation over transformers, switchboards and motor control centers.

3.03 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psig 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 - "Cast-in-Place Concrete."

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire suppression materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

C. Prime and paint all metal supports per Section 09 90 00 requirements similar to “Pipes and Mechanical Equipment”.

3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor fire suppression materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.06 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for fire suppression installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

C. Refer to Division 01 Sections for additional requirements.

3.07 GROUTING

A. Install nonmetallic, non-shrink, grout for fire suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placing of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases to provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION

SECTION 21 05 13 - ELECTRICAL WORK

PART 1 GENERAL

1.01 REFERENCE

A. Section 23 01 05 - Paragraph 1.05 - PENNSYLVANIA ENERGY CODE
C. Division 26 - ELECTRICAL

1.02 SCOPE

A. This Contractor shall furnish all motors for his equipment. Motor starters, safety switches and wired junction boxes shall be furnished and installed by the Electrical Contractor except where specifically specified to be furnished with certain mechanical equipment.

1.03 WORK INCLUDED - This Contractor:

A. 120 volt wiring required for mechanical equipment when not shown or specified elsewhere.

1.05 WORK INCLUDED - Electrical Contractor.

A. All power wiring.

1.06 SHOP DRAWINGS:

A. The Contractor shall furnish to the Electrical Contractor, equipment shop drawings which will indicate power hook-up and control connections as required for mechanical equipment. "Stock" Wiring Diagrams are Not Acceptable.

PART 2 PRODUCTS

2.01 Refer to Section 21 01 05 - Paragraph 1.05 for "Energy Code" requirements (Particularly power factor correction)

2.02 Refer to Division 16 - ELECTRICAL.

2.03 All single-phase motors provided by this Contractor to have built-in thermal overload protection.

2.04 All motors furnished shall have copper windings and all motors five (5) horsepower and greater shall have factory installed lifting eyebolts. All motors shall conform to ANSI and NEMA standards.

PART 3 EXECUTION

3.01 All wiring, conduits, etc., shall be in strict accordance with the requirements of the latest edition of the National Electrical Code and Division 26, Electrical specification.

3.02 All wiring, including low voltage wiring, shall be run in conduit.

3.03 Low voltage wiring may be size and type recommended by the Manufacturer.

END OF SECTION

SECTION 21 05 16 - SLEEVES AND COLLARS

PART 1 GENERAL

1.01 REFERENCE

A. Section 21 05 21 - CUTTING AND PATCHING

1.02 SCOPE

A. This Contractor shall furnish and install all sleeves for his work. Coordinate carefully with the General Contractor.

B. Sleeves shall be provided through all new masonry construction. Sleeves are not required if holes are core drilled through existing walls.

PART 2 PRODUCTS

2.01 Sleeve material: black steel pipe, machine cut, large enough to allow l/4" clearance all around pipe (around pipe covering on chilled water and cold water).

PART 3 EXECUTION

3.01 Sleeves in partitions to have length equal to the thickness of finished partitions. Sleeves in floors of finished areas to project l/8" above finished floor. Sleeves in floors of non-finished areas to project 3" above finished floor. Fill space between pipe and sleeves into exposed areas with sealing compound. Ream all sleeves before installing.

3.02 Where pipes pass through fire rated walls or floors, the space between the pipe and sleeve shall be filled with packing to maintain fire integrity.

3.03 Sleeves to be set in forms before concrete is poured and in partitions at the time same are being built.

3.04 In exposed location, other than in Mechanical Equipment Rooms, bare pipe or insulated pipe shall be provided with chromium plated collars at floor, ceiling, and at partitions.

3.05 Cutting required of any masonry wall or floor after it is in place shall be done by core drilling.

3.06 Piping not allowed to bear on sleeves.

3.07 Sleeves shall be installed plumb and true to line, grade, and position.

3.08 Unused sleeves shall be plugged and finished to match adjacent surface.

END OF SECTION

SECTION 23 05 17 - FIRESTOPPING

PART 1 GENERAL

1.01 SCOPE

A. Each Contractor shall be responsible for firestopping around all openings for pipes, ducts, conduits, etc., installed by him at all fire walls and smoke walls. Firestopping shall be performed by an installer who has been trained by manufacturer, or manufacturer's representative, in the installation procedures based on published UL tested fire stop systems.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 REFERENCE

A. Division 1 – General Conditions
B. Division 3 – Concrete
C. Division 4 – Masonry
D. Division 9 – Finishes
E. Section 21 05 16 – Sleeves and Collars

1.04 GENERAL REQUIRMENTS

A. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops" (July 1997).

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:

a. Through-Penetration Firestop Devices (XHCR)
b. Fire Resistance Ratings (BXUV)
c. Through-Penetration Firestop Systems (XHEZ)
d. Fill, Voids, or Cavity Material (XHHW)
e. Forming Materials (XHKU)

C. International Firestop Council Guidelines for Evaluating Firestop Systems Associating Judgments

D. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials.

E. The Pennsylvania Building Code (OBC)

F. NFPA 101 - Life Safety Code

1.05 QUALITY ASSURANCE

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E-814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994).

1.06 SUBMITTALS

A. Submit Product Data: Manufacturer’s specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor’s name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.07 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A manufacturer’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Scheduling

1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.

2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 PRODUCTS

2.01 FIRESTOPPING, GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that is needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma, (800)879-8000
2. Tremco Sealants & Coatings, Beachwood, Ohio, (216) 292-5000
3. 3M Fire Protection Products, St. Paul, Minnesota, (612) 736-0203

2.03 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices are installed prior to concrete placement for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device
2. Fox Coupling, Inc. "Cast-In-Place Firestop Coupling".
3. Proset Cast-In-Place Device

C. Sealant or caulking materials for use with non-combustible items including steel pipe & copper pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. 3M Fire Barrier CP25 or Firestop Sealant 2000
3. Tremco Fyre Shield

D. Sealant or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601S Elastomeric Firestop Sealant or CP 606 Flexible Firestop Sealant
2. Tremco Fyre-Shield High Performance Ceramic Firestop Sealant
3. 3M Fire Barrier CP25WB+ or 2000 Silicone Sealant

E. Intumescent sealant or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. 3M Fire Barrier CP25WB+
3. Tremco Intumescent Acrylic or TremStop WBM

F. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti CP 642 and CP643 Firestop Collar, CP645 Wrap Strip
2. Tremco TREMstop D Combustible Pipe Intumescent Device System and TremStop WS Wrap Strip
3. 3M Ultra Plastic Pipe Device and Fire Barrier FS-195+ Wrap Strip

G. Materials used for large size/complex penetrations made to accommodate multiple steel and copper pipes, the following products are acceptable:

1. Hilti FS 635 Trowelable Firestop Compound and FS 657 FIRE BLOCK
2. Tremco TremStop M Fire Rated Mortar and PS Pillows
3. 3M Fire Barrier CS-195+ Composite Sheet

H. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate multiple steel and copper pipes, the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK
2. Tremco PS Firestop Pillows
3. 3M CS Intumescent Sheet

I. Provide a firestop system with an "F" Rating as determined by UL 1479 or ASTM E814. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated.

PART 3 EXECUTION

3.01 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.

2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.

3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.

5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

2. Consult with the Owner' Representative and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas. All penetrations are to be labeled in accordance with the University's standard labeling system. The HVAC Contractor shall coordinate all fire stopping requirements with the University prior to start of work.

B. Keep areas of work accessible until inspection and approval have been completed.

C. All fire stopping shall be inspected and approved by a licensed independent Consultant. All unapproved fire stopping products installed by this contractor will be removed and replaced at his expense.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION

SECTION 21 05 19 - PIPING SPECIALTIES

PART 1 GENERAL

1.01 SCOPE

A. Furnish and install all necessary piping specialties to include thermometers, gauges, pipe strainers, etc., for piping systems included under this Contract.

PART 2 PRODUCTS

2.01 Thermometers - Trerice "Industrial Type" blue reading thermometer with blue organic fluid in a 9" cast aluminum case, front double- strength clear glass window, straight or angle pattern as required. Provide brass separable socket. Ashcroft, Marsh, Weiss or Palmer of the same type may be furnished at the Contractor's option. Ranges as shown on the Drawings.

2.02 Pressure Gauges - Weiss 4PGA-l, standard single spring, aluminum case, 4-1/2" diameter with gauge cock and pigtail. Range as indicated on the drawings. Trerice, Marsh or Ashcroft of the same type may be furnished at the Contractor's option. Face to be glass, clear plastic fases are not acceptable.

2.03 Flexible Vibration Joints

A. Expansion and vibration joint connections shall be Metraflex Metrasphere, Mason Industries sphere type, Minnesota Flexible Corporation, Mercer, Phoenix, General Rubber Maxi-Joint Style 1015 or Wheatley single sphere of pipe sizes as shown on the Drawings, to be wire reinforced for pump suction and discharge mounting and designed for minimum of 200 psig working pressure and 220°F operating temperature.

B. Body to be neoprene and nylon with steel flanges.

C. Each joint to be furnished with tie rods.

PART 3 EXECUTION

3.01 All specialties to be installed in accordance with manufacturer's recommendations.

3.02 Flexible vibration joints to be installed within tolerances specified by manufacturer.

3.03 Vent connection to backflow preventer shall be made by means of a fixed air gap. No direct connection will be permitted. Extend line to nearest floor drain.

END OF SECTION

SECTION 21 05 20 - PAINTING

PART 1 GENERAL

1.01 REFERENCE

A. Division 9 - FINISHES
B. Section 21 05 53 - TAGGING AND CODING

1.02 SCOPE

A. All steel supports shall be painted by this contractor per Division 9 requirements.

B. Piping in exposed finished areas shall be painted by this contractor per Division 9 requirments. Mechanical room and shell space piping does not require paint.

C. Factory finished equipment which has rusted or been damaged shall be cleaned at the completion of the project and rust spots and marred areas shall be refinished and restored to the original factory finish.

PART 2 PRODUCTS

2.01 Paint shall meet requirements of Division 9 - Finishes

PART 3 EXECUTION

Not Applicable

END OF SECTION

SECTION 21 05 21 - CUTTING AND PATCHING

PART 1 GENERAL

Not Applicable

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 Cutting for openings, when necessary, shall be done by this Contractor with such tools and methods as to prevent unnecessary damage to surrounding areas or equipment.

3.02 The corners of all openings in poured concrete shall be core drilled to minimize overcutting.

3.03 Fill space in all areas where core drilled with packing where required to maintain fire rating. Openings shall be temporarily fire-stopped until permanent fire stopping is done. This includes holes left due to removal of piping or ductwork.

3.04 All holes cut for the installation of piping, ductwork and equipment shall be neatly patched and refinished with the same materials as, and to match, adjacent surfaces, and damages thereto shall be repaired in kind and to match existing conditions by this Contractor.

3.05 Patching shall match existing surfaces in kind and finish.

3.06 No structural member will be cut into without the expressed permission of the Owner's representative and structural engineer.

END OF SECTION

SECTION 21 05 22 - FOUNDATIONS AND SUPPORTS

PART 1 GENERAL

1.01 SCOPE

A. All concrete foundations and bases for mechanical equipment will be by the General contractor.

B. This Contractor shall furnish welded steel frames and supports for all equipment requiring same. Furnish auxiliary steel as required for supporting pipes.

D. The Plumbing Contractor shall provide concrete foundations for all exterior pipe supports.

PART 2 PRODUCTS

2.01 All steel for frames and supports shall be standard weight black steel pipe or standard structural steel shapes.

2.02 All exterior frames and supports shall be galvanized.

2.03 Concrete for pads shall be a minimum of 6 bag mix per cubic yard with maximum slump of 4" and shall be air entrained 5 to 7% by volume.

PART 3 EXECUTION

3.01 Grind all sharp corners and projections on supporting steel after fabrication. All steel shall have one (1) coat of metal primer after fabrication. All steel supports exposed to the weather shall be finished with a heavy coat of bitumastic.

END OF SECTION

SECTION 21 05 23 - VALVES

PART 1 GENERAL

1.01 SCOPE

A. Furnish and install all necessary valves for piping systems and equipment in the building required to provide proper shut off and balancing of systems included under this Contract.

PART 2 PRODUCTS

2.01 Check valves shall be Crane, Fairbanks, Watts, Jenkins, Nibco, Powell and shall all be by the same manufacturer.

2.02 Ball valves shall be as manufactured by Grinnell, Apollo, Watts. All ball valves to be by the same manufacturer.

2.03 Butterfly valves shall be as manufactured by Keystone, Center Line, Worcester, Watts, Grinnell, Jamesbury. All butterfly valves to be by the same manufacturer.

2.04 Valves in Water Lines:

A. Butterfly Valves

1. 2-1/2" and larger size shall be cast or ductile iron valve. Furnish with lug pattern body, aluminum bronze disc, stainless steel stem, EPDM seat, extended neck for full 2" insulation, and positive shut off at 175 psig W.O.G. (2 ½"-12") and 150 psi W.O.G. (14"-20"). Equal to Keystone Fig. AR-2. Butterfly valves not permitted for size 2" and smaller.

2. 5" and smaller shall have minimum 10 position lever actuators, with positive latching and position indicator. Valves 6" and larger shall have worm gear actuator. Valves shown with chain on Drawings to be chain operated.

3. Valves used on outlets of devices for balance purposes shall have an adjustable memory stop (position lock). A notched operator by itself is not considered a memory stop.

B. Ball Valves

1. 2" size and smaller may be two-piece bronze body full port ball valve, screwed piping connections, union connection body, teflon seats, full port, blowout proof stem, adjustable packing gland, chrome plated bronze ball, and lever handle labeled for service controlled. Rated for 150 S.W.P. and 400 WOG. Equal to Apollo 70-300 Series.

C. Drain valves shall be ball valves as specified above with hose end connection and cap.

D. Check Valves

1. 3" and larger - iron body, bronze mounted, horizontal swing check with bronze disc, flanged, 125 lb. S.W.P.

2. 2-1/2" and smaller - all bronze, horizontal swing check with bronze or TFE disc, screwed, 125 lb. S.W.P.

3. Non-slam check valves at pumps only - 2-1/2" and larger shall be flanged, cast iron or semi-steel body, bronze trim, center guided lift check with bronze disc and stainless steel spring, 125 lb. S.W.P. 2" and smaller shall be screwed, bronze, cast iron or semi-steel body, bronze trim, center guided lift check with bronze or TFE disc and stainless steel or alloy spring, 125 lb. S.W.P.

4. Clow, McAlear, Mueller or Metraflex non-slam check valves are acceptable manufacturers as well as previously listed manufacturers.

PART 3 EXECUTION

3.01 This Contractor shall install all valves in strict accordance to the manufacturer's recommendations.

3.02 Where drain lines are not piped to floor drains, furnish hose end adapters. Provide caps for all hose end adapters.

3.03 Ball valves and butterfly valves designated with an “M” shall be furnished with memory stops.

3.04 This Contractor shall remove the start-up strainer from suction diffusers after pumps are operational and system has been chemically treated.

END OF SECTION

SECTION 21 05 29 - INSERTS, PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SCOPE

A. Furnish and install all necessary inserts, beam clamps and auxiliary steel for pipe hangers in the building.

B. Furnish and install necessary pipe hangers and supports to properly support all piping and to maintain uniform elevation.

PART 2 PRODUCTS

2.01 HANGERS

A. As specified in sections 21 13 13 through 21 13 19 and 21 22 00.

2.02 B-Line, F & S, Elcen, Penn, Fee-Mason, PHD Manufacturing or Modern Pipe Hangers of the same type may be furnished at the Contractor's option.

PART 3 EXECUTION

3.01 Riser clamps shall be used at each floor where required.

3.02 Wall bracket pipe supports shall be installed where required.

3.03 Provide pipe anchors and guides where and as indicated on the Drawings and elsewhere as required to properly control pipe. Method to suit job conditions.

3.04 Support piping at pumps and equipment from floor, ceiling, or walls, so that piping weight is not supported directly from pumps or equipment.

3.05 All beam clamps and supports for piping and ductwork shall be in place prior to the fireproofing of the structural steel.

3.06 Piping to be supported according to the following schedule. Support at intervals not to exceed spacing listed or elsewhere as required in accordance with good workmanship. No pipe shall be supported from another pipe. All hangers shall be plumbed before insulation is applied and all hangers shall be double nutted.

		SPACING
	(1) Steel Pipe	
Pipe Size	Rod	Spacing
Thru 1"	3/8"	7'0"
1-1/4"	3/8"	9'0"
1-1/2"	3/8"	9'0"
2"	3/8"	10'0"
2-1/2"	1/2"	11'0"
3"	1/2"	12'0"
4"	5/8"	14'0"
6"	3/4"	17'0"
8"	7/8"	19'0"
10"	1"	22'0"

12"	1"	23'0"

3.07 Support plastic pipe at intervals not to exceed 4 feet, 6 feet on 4 inch and larger.

3.08 Support piping at pumps and equipment from floor, ceiling, or walls, so that piping weight is not supported directly from pumps or equipment.

END OF SECTION

SECTION 21 05 30 - INSTALLATION OF PIPING

PART 1 GENERAL

1.01 REFERENCE

A. Section 21 05 19 - PIPING SPECIALTIES
B. Section 21 05 23 - VALVES
C. Section 21 05 29 - INSERTS, PIPE HANGERS AND SUPPORTS
D. Section 21 05 93 - TESTS AND ADJUSTMENTS

1.02 SCOPE

A. The requirements of this Section shall apply to all interior piping systems installed under this Contract, except where otherwise noted on the Drawings or elsewhere in the Specifications.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 All piping systems shall be installed with adequate provisions made for expansion and contraction to prevent stresses on piping, valves and equipment. Anchor and guide piping at all points indicated and/or as required. Type and method of anchoring, guiding and attachments to sustaining members to suit job requirements and conditions and shall be approved by University.

3.02 Provide unions or flanges at each final connection, and at each piece of equipment. Branches from mains to equipment stubs, risers, etc., to have swing joints with at least one change of direction in the horizontal plane, and one change of direction in the vertical plane, before connecting to equipment or fixtures. Piping shall be arranged and unions and flanges located to permit easy removal of parts and equipment for inspection and cleaning without disconnecting any part except unions or flanges. No welded connections shall be made to valves or equipment. Use bronze unions in copper lines. Unions to be downstream of valves.

3.03 Flange bolts shall be cut to proper length so that one thread projects beyond the nut when nut and bolt are tightened.

3.04 Make proper connections to all items of equipment in the Contract as recommended by the Manufacturer or as detailed on the Drawings.

3.05 All piping shall be arranged in accordance with the best standards of the trade with vertical pipes plumb and horizontal runs parallel or perpendicular to the building wall.

3.06 Provide valves and specialties where indicated on the Drawings.

3.07 Provide 3/4" drain valves in piping at low points to provide complete drainage of all systems and as shown on the Drawings.

3.08 Ream ends of pipe and clean before installing.

3.09 All joints in copper piping shall be made with 95-5 solder. Solders and fluxes containing lead are prohibited.

3.10 Use pipe dope on male threads of screwed pipe only. Teflon pipe joint tape may be used, at the Contractor's option.

3.11 Valves to be installed with handwheel at or above center of pipe. Valves outdoors exposed to weather shall be installed with handwheel in the horizontal.

3.12 Make all changes of direction with fittings, rather than bending.

3.13 All valves and unions to be installed so as to be accessible through ceiling, access panels, etc.

3.14 Provide dielectric unions or insulating flanges between dissimilar metals, i.e., copper to steel.

3.15 Bull head connections in any piping service are expressly prohibited.

3.16 At the end of each day's work and otherwise as required or directed, provide caps and/or plugs at all openings in piping for protection. Particular attention must be given to avoid the possibility of any foreign materials entering the pipes, whether it be inadvertent or with malicious intent.

3.17 Flanged joints shall be faced true and square. Flanges shall be same face style as mating surface to which it is connected.

3.18 Install thermometers and gauges so they may be read from floor level.

3.19 Where piping is installed in accessible chases, keep all piping to sides of chase, except portions which must necessarily be in center of chase. Offset vents to side immediately above connection to waste line. All lateral runs are to be located at the floor or minimum 6'-0" above floor, and all vertical piping held close to the wall through that height leaving maximum service space.

3.20 Where pipe drops occur in block walls, pipes to enter and leave walls at block joints. Coordinate with General Contractor.

3.21 Install galvanized sheet metal troughs with drains under pipes crossing electrical equipment. Seal to make water tight.

3.22 Do not run water piping through electrical rooms.

END OF SECTION

SECTION 21 05 53 - TAGGING AND CODING

PART 1 GENERAL

1.01 SCOPE

A. Provide brass tags on all valves. Tags shall state type of line in which the valve is installed (fire protection piping.) and number of valve. Furnish a schedule or schedules of all valves tagged with number, location and purpose of each valve and mount schedules under glass on Equipment Room wall, or elsewhere as required. Schedules shall be located near and convenient to the valves on the schedule.

B. In the case of remodeling work when a valve identification system already exists, numbering shall start with the next number after the highest existing number.

C. After exposed piping is complete, this Contractor shall apply 2" wide color bands on each side of a stenciled legend, lettered with the name of contents of piping. Flow direction arrows of the same colors are to be located adjacent to the Identification Legends. Spacing not over 20 ft. apart and at least once in each room. Do not use adhesive markers. Color per NFPA 13 standards.

PART 2 PRODUCTS

2.01 Valve tags shall be brass minimum 16 gauge.

PART 3 EXECUTION

Not Applicable

END OF SECTION

SECTION 21 05 54 - EQUIPMENT IDENTIFICATION

PART 1 GENERAL

1.01 SCOPE

A. This Contractor shall label all disconnects, motor starters, switches and equipment furnished under this Contract.

PART 2 PRODUCTS

2.01 Labels shall be 1/16" thick laminated plastic nameplates or 0.020" thick aluminum nameplates. Background shall be black with 3/16" letters engraved on the face. Letters shall be white or natural aluminum. Equipment labels shall include the area served by equipment, horsepower, and flow.

2.02 After exposed piping and insulation is painted, this Contractor shall apply 2" wide color bands on each side of a stenciled legend, lettered with the name of contents of piping. Flow direction arrows of the same colors are to be located adjacent to the Identification Legends. Spacing not over 20 ft. apart and at least once in each room. Do not use adhesive markers. Color as follows:

Contents	Color	Designation
Fire Protection Water	Red	FL

PART 3 EXECUTION

3.01 Secure plates with screws. Do not attach to covers where covers can be easily mixed up.

END OF SECTION

SECTION 21 05 93 - TESTS AND ADJUSTMENTS

PART 1 GENERAL

1.01 SCOPE

A. After work has been completed but before pipe covering has been applied, the Contractor shall test and adjust the systems he has installed.

B. The Architect shall be notified of all scheduled tests and adjustments at least 48 hours before they are scheduled so that he may witness same. If the Contractor performs any test or adjustment without the Architect present or without properly notifying the Architect, the Contractor will be required to perform the test or adjustment a second time in the presence of the Architect.

C. If the Architect determines that any work requires special inspection, testing, or approval, they will, upon written authorization, instruct the Contractor to order such special inspection, testing or approval. The Contractor shall give timely notice so the Architect may observe the inspections, tests or approvals. If such special inspection or testing reveals a failure of the work to comply with the requirements of the Contract Documents, the Contractor shall bear all costs thereof, including compensation for the Architect's additional services made necessary by such failure; otherwise the owner shall bear such costs, and an appropriate Change Order shall be issued.

D. Concealed lines shall be tested before being concealed. If this is not done and a leak appears during the final test, this Contractor shall repair leak and all damage resulting therefrom.

E. This Contractor shall adjust all his equipment in the mechanical system to obtain proper operation and shall demonstrate to Owner and the Architect that the entire system will function properly.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 After work has been completed but before pipe covering has been applied, the Contractor shall test the systems as follows. At these pressures, the circulation shall be free and the piping free of leaks.

System	Test Medium	Pressure Not Less Than	Time Not LessThan	Notes
Sprinkler system	Water	200 lbs	3 hrs	no drop

3.02 Before turning job over to Owner, inspect all valves and repack valves as necessary.

3.03 This Contractor shall adjust all equipment in the mechanical system to obtain proper operation and shall demonstrate to Owner and the Architect that the entire system will function properly.

END OF SECTION

SECTION 21 05 94 - PROTECTION AND CLEANING

PART 1 GENERAL

Not Applicable

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 Protect all mechanical equipment against damage from any cause whatsoever and pay the cost of replacing and repairing equipment made necessary by failure to provide suitable protection.

3.02 After all piping and equipment has been approved and after all plastering has been completed, bare piping and insulation provided under this Contract shall be thoroughly cleaned of dirt, grease, rust and oil.

3.03 Repair all dents and scratches in factory prime or finish coats on all mechanical equipment to the satisfaction of Associate. If damage is excessive, replacement may be required.

3.04 Flush out all piping systems to remove all dirt and grease from pipes and equipment before systems are placed in operation.

3.05 Cover all pumps, open pipes, etc., to keep out dirt, water and weather during construction.

3.06 This Contractor shall clean up and remove all debris from the site and shall at all times keep the premises in a neat and orderly condition.

END OF SECTION

SECTION 21 06 00 - MANUFACTURER'S DRAWINGS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall submit for review ten (10) copies of fire protection equipment submittals, hydraulic calculations and sprinkler layout drawings, etc as noted below in three distinct sequential stages:

1. Materials and Equipment List: Include all materials, equipment, and accessories required for work. Include catalog ID numbers, drawings, cut sheets as necessary to define the work. If cut sheets include multiple selections, and or optional selections, then clearly label the included sections and the included options. Submit to the Architect for review.

2. Preliminary Shop Drawings: Include sprinkler head locations only. Include full-size detail representation of each style of sprinkler head to be used. Submit to the Architect for review.

3. Detailed Shop Drawings: Include pipe layout and sizing, sprinkler head locations coordinated onto reflected ceiling drawings, hydraulic calculations, system controls, and all equipment cut sheets, zone valves, zone drain valves, and zone test stations. Submit to all required parties, Architect, Authority Having Jurisdiction (AHJ), the local Fire Chief, State Fire Marshal, and the Owner's Insurance Underwriter, for review and approval by all.

B. The Assocaite will review Contractor's shop drawings and related submittals (as indicated above and below) with respect to the ability of the detailed work, when complete, to be a properly functioning integral element of the overall system designed by the Assocaite. Before submitting a shop drawing or any related material to the Assocaite, Contractor shall: review each such submission for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of Contractor; approve each such submission before submitting it; and so stamp each such submission before submitting it. The Assocaite shall assume that no shop drawing or related submittal comprises a variation unless Contractor advises Assocaite otherwise via a written instrument which is acknowledged by Assocaite in writing. The shop drawings and related material (if any) called for are indicated below:

Fire Protection Contract

Sprinkler Drawings
Fire Protection Equipment
Pipe, Hangers, and Fittings
Sprinkler Heads
Hydraulic Calcuations
Tamper Switches
Flow Switches
Supervisory Switches

C. The Assocaite shall return shop drawings and related materials with comments provided that each submission has been called for and is stamped by Contractor as indicated above. The Assocaite shall return without comment material not called for or which has not been approved by Contractor.

D. This Contractor shall furnish equipment shop drawings which will indicate power hook up and control connections as required for mechanical equipment. "Stock" wiring diagrams are NOT ACCEPTABLE.

E. The HVAC Contractor is to provide sepias of sheet metal drawings for use in coordinating work of Plumbing, Fire Protection and Electrical with layout of air distributions system and related work. Lighting, ceiling grid and ceiling access doors will be shown lightly to verify coordination. HVAC Contractor to provide initial sepias within 60 days of award of contract. Each Prime Contractor is responsible for overlaying his work onto these sepias; for providing information as to size, elevation and location proposed for all components; and for coordination of his work with that of other Contractors. Final resolution of all items to be determined at project meetings held by Lead Contractor.

F. Assocaite's review of manufacturer's drawings or schedules shall not relieve the Contractor from compliance with the requirements of the plans and specifications.

1.02 QUANTITIES

A. Items may be referred to in singular or plural on Plans and Specifications. Contractor is responsible for determining quantity of each item.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

Not Applicable

END OF SECTION

SECTION 21 10 00 - FIRE SUPPRESSION SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pipe and Fittings.
2. Sprinklers.

B. Related Documents:

1. Marriott's Fire Protection and Life Safety Design Standards (Module 14):
    a. Marriott's Fire Protection and Life Safety Design Standards apply to all Marriott International Brands as well as Owned, Managed and Franchised properties.
    b. Marriott's Fire Protection and Life Safety Design Standards include Design Standards, performance criteria, reference standards and life safety process verification that define a comprehensive fire protection program.

C. Related Sections:

1. Section 21 05 00 – Common Work Results for Fire Suppression
2. Section 28 31 00 - Fire Alarm and Detection Systems: Wire and connection of sprinkler flow and tamper switches

1.02 SYSTEM DESCRIPTION

A. The Fire Protection Subcontractor is responsible for code compliance, research, design, coordination, and installation of a complete and functional hydraulically calculated sprinkler system (and standpipe system, if required) that meets the approval of and is in accordance with all applicable regulations and requirements of the following and as further specified:

1. Current editions of NFPA 13, 14, 25, and 96.
2. Applicable Codes.
3. Authorities having jurisdiction.

B. Alarm system devices including alarm valves, flow switches, pressure switches, tamper switches and coordination with Fire Alarm and Detection Subcontractor.

C. Shop drawings and calculations prepared and submitted in accordance with the requirements of all Authorities Having Jurisdiction.

D. Obtaining all permits and approvals of the fire protection system.

E. Field acceptance testing.

1.03 SUBMITTALS

A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

1. Product Data:
    a. Mark each copy to identify applicable products, characteristics, models, options and other supplemental data to clearly communicate information specific to this project.
    b. Submit separate "Letter of Conformance" for each specified item.
2. Shop Drawings and calculations sealed by a registered Professional Engineer, NICET III or IV Sprinkler Designer, licensed in the state where the project is located.

3. Be responsible for code research and obtaining all required flow test data and hydraulically designing a fire protection system that meets all applicable requirements. Arrange for, and conduct the flow test.
4. Fire protection submittal data shall include the following:
5. Flow Test Data.
6. Complete Hydraulic Calculations.
7. Complete Stamped and Coordinated Shop Drawings.
8. Pipe and Fittings.
9. Valves.
10. Sprinkler Heads.
11. Escutcheons.
12. All Applicable Devices, Alarms, and Specialties.
13. Air Compressor and Accessories
14. Fire Pump and Accessories
15. Applicable Control/Wiring Diagrams.
16. Fire Department Connections
17. Valve Cabinets
18. Backflow Preventers.

B. Submittal data shall be bound sets and be submitted at one time in accordance with Section 01330 - Submittals and Substitutions.

C. Transmit fire protection submittal data to Zurich Services Corporation, Marriott's Fire Protection Department, and to the local and state Authorities having jurisdiction and licensing agencies for approval.

1. Mailing Addresses:

a. Marriott International, Inc.

Marriott Corporate Fire Protection, Dept. 52/924.36
1 Marriott Drive
Washington, D.C. 20058

b. Zurich Services Corporation

Risk Engineering Department
1818 Market Street, 21st Floor
Philadelphia, PA 19103
Attn: Mr. Richard Gallagher, Sr. Risk Engineer Consultant

D. Do not proceed with work without final approved submittal data bearing all approval stamps including Marriott's Fire Protection Department approval stamp.

E. Be responsible for delays caused by not following the above procedure and/or not completing the design portion of the work in a timely manner.

F. Record Documents:

1. Refer to Section 01 78 39 - Project Record Documents and Section 01 78 23 - Operating and Maintenance Data for required closeout documents to be provided at completion of Project. In addition to the documents listed in these Sections, the following documents shall be included:

a. Provide above/below ground test certificates.

b. Record Documents shall include System Drawings, Equipment Data and Operation Instructions, and Maintenance Instruction Manuals.

1.04 QUALITY ASSURANCE

A. Refer to Section 21 05 00 – Common Work Results for Fire Suppression.

B. Fire Pump: The manufacturer shall provide the services of a qualified Field Engineer to assist in the proper installation of equipment, make necessary mechanical adjustments, and align fire pump flexible coupling. Arrange, conduct and provide all required test equipment for Field Acceptance test. Test shall be witnessed by the Fire Marshal and the authority having jurisdiction and the Owner.

C. MANUFACTURERS

1. All sprinkler system equipment is to be UL Listed.

1.05 DESIGN

A. Zoning: At a minimum, the system shall be zoned by floor or as required to meet the approval of all applicable Codes and Authorities, whichever is most stringent.

B. Inspectors test connections: Locate at the remote end of each zone with discharge pipe to exterior.

C. Low-Rise Buildings: Connect sprinkler piping to riser at each zone. Provide control valve, flow and tamper switches at each connection monitored on the fire alarm system. Locate inspector's test assembly at remote end of zone with discharge piped to exterior drain.

D. Design densities (based on NFPA 13 requirements):

1. Guest Rooms: Wet pipe system with 0.10 gpm per square foot, all heads (up to a maximum of 5) in the largest most remote guestroom plus 100 gpm for hose.

2. Public Spaces, Offices, and Dining Room: Wet pipe system with 0.10 gpm per square foot over the most remote 1,500 square feet plus 100 gpm for hose.

3. Kitchen Areas: Wet pipe system with 0.15 gpm per square foot over the most remote 1,500 square feet area plus 100 gpm for hose.

4. Mechanical rooms, Laundry, Storage, and Service Areas: Wet pipe system with 0.13 gpm per square foot over 2,500 square feet plus 100 gpm for hose.

5. Kitchen Exhaust Ductwork: Wet pipe system with 0.15 gpm per square foot over the entire cooking hood and duct plan area plus 100 gpm for hose.

6. Attics: Light hazard wet pipe system with 0.10 gpm per square foot to the most remote 1,950 square feet plus 100 gpm for hose.

1.06 COORDINATION

A. The Fire Protection Subcontractor shall be responsible for reviewing the complete set of Contract Documents and coordinating his work with all other trades involved including building design loads.

B. Sprinkler head locations shall be as shown on the Architectural Reflected Ceiling Plans. If the Contractor finds that additional sprinklers are required to meet Codes, the Contractor shall proceed with the additional heads at no additional cost to the Owner.

C. The fire protection piping and head layout shall function in such a manner so as not to interfere with lighting fixtures, air distribution devices, equipment, piping, beams, and ductwork. The work under this section shall yield to all other trades.

1.07 SPRINKLER/STANDPIPE SYSTEM

A. Provide the building with a complete, approved, operational sprinkler system in all areas.

B. Provide wet-pipe sprinklers for habitable spaces such as guestrooms, guestroom corridors, meeting rooms and public areas.

C. Design documents are for information only. The Sprinkler subcontractor shall be responsible for the actual layouts, routing of piping, and additional sprinkler heads to meet all requirements of the authority having jurisdiction; as well as the provision of a fire pump.

D. Be responsible for freeze protection as follows:

1. A dry pipe system shall be provided in the attics and in any other unheated areas where necessary so as to prevent freezing. The dry pipe system shall be complete with a tank mounted air compressor, storage tank, controls, valves, galvanized steel pipe, and all necessary appurtenances for a complete, functional system. Dry pipe system shall be pitched to avoid freezing. Termination of drains shall be approved by Marriott's Fire Protection Department.

2. Dry type heads may be provided off the wet system in unheated areas such as the attic, landscape storage room.

3. Wet piping shall not be routed through unheated areas, such as attics, etc.

4. For repairing and/or all costs incurred from damage caused by freezing of the fire protection system.

5. Use of Heat-tape is not acceptable.

6. The dry pipe system is required to deliver water to the system test connection within 60 seconds, starting at the normal air pressure on the system and at the time of fully opened inspection test connection.

7. Anti-Freeze systems are not acceptable..

E. Provide a Fire Department standpipe system where required by code.

F. Provide a combination sprinkler/standpipe riser system where standpipes are required by code.

G. The sprinkler layout for the guest rooms, suites, and corridors shall be as required to meet the approval of all applicable Codes, and Local Authorities whichever is most stringent.

H. The Contractor shall provide a fire pump complete with a jockey pump, controller, and all devices necessary for a complete, approved functional system per NFPA 20, and Local Authorities.

I. Guest Room Bathrooms: Sprinklers not required if less than 55 square feet unless combustible (with flame spread rating of greater than 25; i.e., fiberglass or plastic) tubs or shower enclosures are used.

J. Safety Factor: Provide a 10% hydraulic safety factor up to a maximum of 10 psi.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. All sprinkler system equipment is to be UL Listed.

2.02 PIPE AND FITTINGS

A. Piping - Class I, Schedule 40 ASTM black steel piping for branches and Class I Schedule 10 ASTM black steel for mains.

1. Piping (piping only, excluding fittings) for dry systems shall be galvanized steel.

2. Alternate: CPVC or XL Thin-wall for wet sprinkler pipe.

B. Exposed piping and fittings in kitchen shall be chrome-plated.

2.03 KITCHEN HOOD AND DUCT FIRE SUPPRESSION

A. Provide a complete "Ansul Piranha" automatic, water-assisted, wet chemical, fire suppression system by Tyco Fire & Security for protection of the exhaust duct and all grease-producing cooking surfaces located under canopy hoods. The system, including all of its components shall be UL Standard 300 listed.

B. Kitchen hood and duct system flow switch (or control units of the Ansul fire suppression system) to perform these functions:

1. Send fire alarm signal to FACP
2. Disconnect gas and all electric for cooking appliances and lighting under the hood (manual reset is required).
3. Shut-off kitchen hood make-up air handler.

2.04 SPRINKLERS

A. Sprinkler heads shall be UL Listed.

B. Sprinkler heads and escutcheons shall have a white finish unless noted otherwise.

C. Sprinklers: Fast-response 68 degrees C – 74 degrees C (155 degrees F – 165 degrees F), recessed or semi-recessed type heads throughout, except as follows:

Room/Space	Head Type	Temp. Rating
Attic Systems	Quick Response – ventilated	100 degrees C (212 degrees F)
	Quick Response unventilated	141 degrees C (286 degrees F)
Drypipe Systems	Quick Response	100 degrees C (212 degrees F)
Mech./Elect.	Quick Response	68 degrees C – 74 degrees C
Elevator Machinery	Quick Response	100 degrees C (212 degrees F)
Swimming Pools	Corrosion - proof- Quick response	68 degrees C –77degrees C (155 degrees F –170 degrees F)
Porches	Dry-side wall, corrosion-roof / Quick response	100 degrees C (212 degrees F)
Balcony (combustible)	Dry-side wall, corrosion-resistant / Quick response	100 degrees C (212 degrees F)
Sauna/Steam Rooms	Corrosion-proof / Quick Response	141 degrees C (286 degrees F)
Walk-in Coolers/Freezers	Dry pendent / Quick response	74 degrees C (165 degrees F)

PART 3 EXECUTION

3.01 INSTALLATION

A. Install and support fire protection system to resist all applicable seismic forces per requirements.

B. Locate wet pipe and dry pipe inspector test valves and associated sight glasses at remote ends of system, in accessible locations. Provide drain pipes to exterior. Do not discharge onto sidewalks or landscaping.

C. Under no circumstance shall wet sprinkler pipes be routed through attics or other unheated spaces.

D. Access panels for service and access to valves in enclosed ceiling and walls.

3.02 TESTING

A. Before a property is opened to the public, the fire protection system shall be fully operational, contractor tested, and approval obtained from Marriott's Fire Protection Department. In order to obtain Marriott's approval, the fire protection system shall be operated by the contractor under simulated emergency conditions in the presence of Marriott Fire Protection personnel and the contractor shall demonstrate compliance with Marriott's standards.

B. Automatic Sprinkler System:

1. Contractor shall flush and pressure test system prior to Marriott's observation of the test of water flow and tamper switches.

C. Kitchen Hood and Duct Fire Suppression:

1. Contractor shall pre-test all coordinated components by activation of kitchen hood and duct flow switch or control unit.

2. Contractor shall demonstrate compliance by operating initiating devices, activating coordinated alarms, gas, electric, and hood supply air fan shut-downs.

D. Provide all equipment necessary to perform test.

E. Refer to Submittals Paragraph for required certifications and documents to be provided with closeout documents.

3.03 TRAINING

A. Conduct training as specified in Section 01 79 00 - "Training".

B. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining system.

C. Schedule training with Owner with at least seven days' advance notice.

D. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate and maintain fire pump.

END OF SECTION

SECTION 21 11 00 - FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING

PART 1 GENERAL

1.01 REFERENCE

A. Section 15050 – EXCAVATION AND BACKFILL
B. Section 00 43 10 – BREAK OUT PRICING
C. Section 01 21 00 - ALLOWANCES
D. Section 01 23 00 - ALTERNATES
E. Section 21 00 00 – FIRE PROTECTION GENERAL
F. Section 21 10 00 – FIRE SUPPRESION SYSTEMS
G. Section 21 12 00 – FIRE PROTECTION STANDPIPE SYSTEM

1.02 SCOPE

A. From connection point provided at 5 feet beyond building perimeter wall at the location indicated on plans extend piping into structure and provide a building fire protection water supply main riser, immediately adjacent to the building entry point. The connection at 5 feet beyond perimeter wall is provided by the site utility contractor under separate contract. Provide piping manifold outlet connection downstream of riser installation for extension to building fire protection water system.

C. All elements to be in accordance with the standards of the Division of Water and the Fire Department/Fire Prevention Authority in regard to materials and methods of installation, confirmed by this contractor in advance of work. Acceptability of final installation is subject to review and approval by the Division of Water.

PART 2 PRODUCTS

2.01 UNDERGROUND PIPE AND FITTINGS

A. Piping from underground connection point to 12” above floor at building interior to be same as that installed by the site utility contractor, including material, fittings, joints/connections and method of installation. Conditions to be confirmed in advance and installation coordinated with the site utility contractor.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Fire Protection Contractor is to contact and coordinate with the Division of Water and the Fire Department/Fire Prevention authority in advance of work at the underground water service and building entrance. All materials, equipment and installation of items to be per the standards established by the Division of Water and the Fire Department/Fire Prevention authority, inlcuding, but not limited to Fire Department inlet connections.

B. Underground service line outside the building to have minimum of 48” cover, unless additional cover is required by the Division of Water and/or Plumbing Code authority. Verify cover requirement with these agencies in advance of installation, and comply with any additional cover requirements indicated.

C. Provide concrete thrust blocks and/or restrained joints at underground piping installation in compliance with the recommendations of NFPA Pamphlet No. 24, as a minimum standard.

D. Provide support for water service piping where it enters the building with an assembly of bitumastic coated rods and pipe clamps as described in NFPA Pamphlet No. 24.

E. The underground water service shall be tested, cleaned and inspected in accordance with the requirements of the Division of Water and/or the Plumbing code authority.

3.02 Where the location of the water pipe is not clearly defined in dimensions on the Drawings, the water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 18 inches above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 6 feet from the sewer. Where water lines cross under gravity- flow sewer lines, the sewer pipe for a distance of at least 10 feet each side of the crossing shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing. Water lines shall in all cases cross above sewage force mains and shall be not less than 2 feet above the sewer main. Joints in the sewer main, closer horizontally than 3 feet to the crossing, shall be encased in concrete. Where a water main passes under a sewer, adequate structural support shall be provided for the sewer to prevent damage to the water main.

3.03 Coordinate installation with structure, site conditions and work of other trades at and adjacent to fire protection water service piping installation.

3.04 Maintain necessary clearance from structural support elements as required for installation of fire protection water service piping outside of support/bearing zones.

END OF SECTION

SECTION 21 12 00 - FIRE- SUPPRESSION STANDPIPES

PART 1 GENERAL

1.01 REFERENCE

A. Section 21 05 00 – COMMON WORK RESULTS FOR FIRE SUPPRESSION
B. Section 21 10 00 – FIRE SUPPRESSION SYSTEMS
C. Section 21 31 00 – ELECTRIC DRIVE CENTRIFUGAL PUMPS

1.02 SCOPE

A. Furnish and install a complete and approved standpipe and Fire Department interior hose connection system. System to be complete with all pipe supports and offsets necessary to clear structure, and all other items/elements provided under separate contract.

B. Standpipe system shall be installed complete with all necessary accessories, appurtenances and items/elements required for proper, approved operation and in accordance with Marriott design guidelines. This includes, but is not limited to sprinkler heads, interconnecting standpipes, piping, safety factors, et.

PART 2 PRODUCTS

2.01 Refer to section 21 10 00 – FIRE SUPPRESSION SYSTEMS for equipment and materials not specified herein.

2.02 HOSE CONNECTIONS

A. Fire department inside hose connections to be similar to Potter Roemer model no. 4065-D 2 ½" cast brass angle valve, furnished with threaded female inlet/male outlet, wheel handle operator, 300 psig working pressure rating and polished chrome finish. Outlet threads to be as specified by the local Fire Department, verified in advance by the Fire Protection Contractor. Provide with no. 4625-D brass cap with chain and polished chrome finish.

B. Hose connections as manufactured/provided by Elkhart, Powhatten, Guardian or Croker may be furnished at the contractor's option.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide drain valves and auxiliary drains per NFPA Requirements, and at low points of system to allow complete drainage. Contractor to be responsible to install sprinkler system to drain properly. Piping shall be installed to drain at the main riser whenever possible.

B. Install valves and specialties where indicated and/or as required for approval.

C. The entire standpipe system installation shall conform to the requirements of NFPA pamphlet no. 14.

D. Piping must be lined up paralleling and at right angles to the building walls and other

primary structural elements; angular offsets such as 45° cuts across corners and elsewhere will not be permitted unless specifically shown.

E. This Contractor MUST assume the full responsibility of verifying present elevations in the field and making any adjustments as may be necessary, all of which MUST be included in his Proposal Price.

3.02 Provide sleeves for pipes where piping penetrates masonry walls. All pipe penetrations through masonry walls shall be adequately sealed with mortar or approved fire resistant caulking.

3.03 Fire protection piping and standpipe installations shall be installed in as timely a manner as possible, and made available for use by the Fire Department at the first opportunity as construction progresses.

END OF SECTION

SECTION 21 13 16 - DRY-PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 REFERENCE

A. Section 21 00 00 – FIRE PROTECTION – GENERAL
B. Section 21 10 00 – FIRE SUPPRESSION SYSTEM

1.02 SCOPE

A. Furnish and install complete and approved dry pipe sprinkler system(s).

B. System(s) to be complete with all components and accessories necessary for proper operation.

C. System(s) to be complete with all supports and offsets necessary to coordinate installation with structure and work of other trades, as determined by the Fire Protection Contractor.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. Pipe and fittings shall be Schedule 40 hot dipped zinc coated (galvanized) steel pipe with galvanized 175 psig working pressure cast iron or malleable iron screwed fittings per NFPA Standards.

B. Schedule 40 galvanized steel pipe and fittings with rolled grooves, and Victaulic Firelok 005 type rigid galvanized couplings with silicone gaskets listed for dry service may be provided at the Contractor's option.

2.02 PIPING HANGERS AND SUPPORTS

A. Provide galvanized finish for all hanger elements in direct contact with galvanized piping system elements.

B. Piping shall be adequately supported by means of hangers and supports, and be in compliance with NFPA Pamphlet 13. Carry overhead lines directly on supports or suspend by hangers from supports. Furnish required supporting steel, hangers, etc.

C. Piping at equipment and control valves, etc. shall be supported so that those elements/items can be removed without providing additional support elements. Piping shall not introduce any strains or distortions on connected equipment. Vertical piping shall be supported at base of riser.

D. The Following Items Shall Be Provided:

1. Supplementary channels, plates, etc. where supports are required between building structural members, spanning the space and attached to building structural members by welding or bolting.

2. All rods, angles, rails, struts, braces, plates, platforms, etc., required for suspension and/or support of piping, and all miscellaneous specialties and items/elements required for the attachment of hangers and supports to the

structure.

E. Unless Otherwise Noted, Hangers Shall Be As Follows:

1. Piping 8" size and smaller, hanger shall be similar to Grinnell Fig. 69, with galvanized adjustable nut and carbon steel band.

2. Trapeze Hangers

a. Where several pipes occur at the same elevation, Trapeze type hangers may be used. Trapeze hangers shall be similar to Grinnell Fig. 46 with Grinnell Fig. 137 U-Bolt or Fig. 262 strap. Bracket shall be Grinnell Fig. 195.

2.03 VALVES AND SPECIALTIES

A. Gate valves – listed/approved outside screw and yoke, bronze, wedge disc, screwed type for size 2" and smaller, flanged for sizes 2-1/2" and larger, with iron body and bronze fittings. Counterclockwise opening and 175 psig working pressure. Use non-rising-stem type for post indicating valve assemblies.

1. Where gate valves are indicated on plans, the contractor may, at his option, use butterfly valves as specified in section 21 05 23, provided they are listed/approved for Fire Protection service.

B. Water pressure gauges – listed/approved 3-1/2" brass pressure gauges range 0 to 300 psig, with NPT male pipe connection. Install at each Inspector's test connection, alarm valve and elsewhere as required.

C. Inspector's Test Connections - 1" Inspector's Test Connections shall be installed as required per authorities having jurisdiction. Discharge shall run to open air unless indicated otherwise. All Inspector's Test Connections to control valves shall be located and installed per the requirements of the local fire department, verified in advance by the Fire Protection Contractor. Provide metal tag connected to control valve bearing words, "INSPECTOR'S TEST."

D. Contractor to furnish and install identification signage where required, similar to Reliable Model A. As a minimum, an engraved sign shall be provided at the main supply riser/control valve indicating basic design information.

E. Sprinkler valves and accessories as manufactured/provided by Reliable, Automatic, Central, Grinnell, Viking or Victaulic may be furnished at the Contractor's option.

2.04 SPRINKLERS

A. In all areas having ceilings with surface mounted light fixtures, the Sprinkler Contractor shall install sprinkler heads with two-piece deep escutcheon plates.

B. Sprinkler Head Cabinet - provide cabinet, (coordinate location with Owner) with sprinkler heads and head wrench for emergency use. Sprinkler types supplied to be proportioned to correspond with quantities in Building but have minimum of two (2) sprinklers of each type. Quantities per NFPA No. 13.

C. On all pendant type dry heads (if any), provide dry pipe supply barrels with length so that system branch lines will drain back to mains. Dry heads in dropped ceilings (if any) to be provided with two-piece adjustable polished chrome escutcheons.

2.05 Unless indicated otherwise, equipment and accessories complying with this specification as manufactured by Reliable, Automatic, Central, Grinnell, Viking or Gem may be furnished at the Contractor's option.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide drain valves and dry system auxiliary drains per NFPA requirements and at low points of system to allow complete drainage as actually installed. Contractor to be responsible to install sprinkler system to drain properly. Piping shall be arranged to drain at the main riser whenever possible.

B. Install valves and specialties where indicated and/or as required for approval.

C. Piping must be lined up paralleling and at right angles to the building walls and other primary structural elements; angular offsets such as 45x cuts across corners and elsewhere will not be permitted unless specifically shown.

D. This Contractor MUST assume the full responsibility of verifying elevations in the field and making any adjustments as may be necessary, all of which MUST be included in his Proposal Price.

3.02 PIPING

A. Install system as required to allow complete drain down back to main riser drain. If trapped sections are unavoidable, provide clearly identified accessible auxiliary drain, permanently piped to approved drain point(s). Entire installation to be sloped to drain.

B. All pendant sprinkler heads in dry pipe systems to be provided with individual “armover” supply branches installed to provide maximum drainage back to mains without removal of sprinkler heads for system drain down.

3.03 SPRINKLER HEADS

A. Heads to have standard 1/2" orifices unless otherwise noted to meet NFPA requirements.

B. All sprinklers to have correct temperature ratings, as determined by the Fire Protection Contractor for specific conditions at each location.

C. Quantity and location of sprinklers to be determined by the Fire Protection Contractor, as required for proper protection and coverage specified on plans.

D. Recessed pendant sprinkler heads are to be installed to extend a maximum of 1” below ceiling structure at each location. All recessed heads (pendant and/or sidewall) withing the same area or enclosure are to have no greater than ¼” (plus/minus) difference in elevation/extension relative to adjacent heads. Sidewall heads to extend a maximum of 1 ½” beyond structure into protection area.

E. All sprinkler heads installed in light and ordinary hazard occupancy areas to be listed "quick response" type in accordance with NFPA pamphlet no. 13 requirements.

END OF SECTION

SECTION 21 31 13 - DIESEL-DRIVE, CENTRIFUGAL FIRE PUMPS

PART 1 GENERAL

1.01 REFERENCES

A. Section 21 05 00 – COMMON WORK RESULTS FOR FIRE SUPPRESSION
B. Section 21 10 00 – FIRE SUPPRESSION SYSTEMS
C. Section 21 12 00 – FIRE SUPPRESSION STANDPIPES

1.02 SCOPE

A. Furnish and install a complete approved Fire Pump assembly installation, including all fittings, accessories and appurtenances necessary for proper operation, compliance with referenced standards, and the requirements of all review, inspection and approval authorities.

B. The fire pump and drive motor shall be a pre-assembled package unit mounted on a common steel baseplate, including all interconnecting components required for proper, approved operation.

C. The fire pump controller, jockey pump controller and low suction pressure cut-off control panel shall be individual listed/approved prewired assemblies, shipped loose for installation and final connection in field by the fire protection contractor.

PART 2 PRODUCTS

2.01 FIRE PUMP, DRIVE MOTOR, CONTROLLER AND ACCESSORIES; as specified on plans.

A. The pump shall be furnished complete with the following accessories:

1. Eccentric Suction Reducer
2. Concentric Discharge Increaser
3. Casing Relief Valve
4. Automatic Air Release Valve
5. Ball Drip Valve - (Required on outside Hose Valve Test Header.)
6. Suction and Discharge Gauges

B. Pump diesel drive motor shall be a U.L. listed open drip-proof type, listed for installation in 40°C ambient, ratings and capacities as indicated on plans, with 1.15 service factor.

C. The drive motor starter and disconnect, and control panel lug connections shall be listed “Service Entrance Rated”. Lugs for incoming electric power feeder to the fire pump controller, and connection between the controller and drive motor shall be sized for cable as indicated by Electrical Contract documentation. Electric service connection elements, ratings and capacities to be confirmed with the Electrical Contractor prior to submittal for approval, and shipment of controller. Factory wired pre-fabricated controller assembly and applicable

individual components to be U.L. listed, and in compliance with the requirements of NFPA pamphlets no. 20 and 70.

D. The fire pump shall deliver not less than 150 percent of rated capacity at a pressure not less than 65 percent of rated head.

E. Equal fire pump and drive motor assemblies as manufactured by Aurora or Patterson may be provided at the Contractor's option.

2.02 JOCKEY PUMP, DRIVE MOTOR, CONTROLLER AND ACCESSORIES; as specified on plans.

A. Pump shall be a vertical centrifugal, multi stage, close coupled type, to include mechanical seal, stainless steel shaft and bronze impeller. Ratings and capacities as indicated on plans.

B. A turbine vane pump, or any pump having a steep performance curve, will not be acceptable.

C. Drive motor and controller electric service connection elements, ratings and capacities to be confirmed with the Electrical Contractor prior to submittal for approval, and shipment of controller. Factory wired pre-fabricated controller assembly and applicable individual components to be U.L. listed, and in compliance with the requirements of NFPA pamphlets no. 20 and 70.

D. Equal pump and drive motor assemblies as manufactured by Grundfos, Fairbanks Morse, or any of the listed fire pump manufacturers may be furnished at the contractor’s option.

2.03 Equal pump controllers as manufactured by Metron, Joslyn-Clark, Master, Cutler Hammer, or Lexington may be provided at the Contractor's option.

2.04 Furnish low suction pressure cut-off control per EPA and Pennsylvania Board of Health requirements, with externally mounted pressure switch, visual and audible alarms, and arranged for supervised 120V, 60 HZ, 1 PH incoming electric power. Panel to be configured to stop the fire pump if the supply pressure drops to 20 psig or less for a time period of more than 30 seconds. Reset and control requirements to be in accordance with the Division of Water, Board of Health, and the EPA, as confirmed by the fire protection contractor. Controller assembly and applicable individual components to be U.L. listed.

PART 3 EXECUTION

3.01 The fire pump controller shall have all necessary wiring to the drive motor completed in the field, by the Electrical Contractor.

3.02 Prior to shipment, the pump, motor and controller shall be thoroughly shop tested by the pump manufacturer as a unit, with written certification indicating test results provided on delivery. The pump manufacturer shall assume unit installation/operation responsibility and shall provide the services of a qualified engineer to align couplings and check all items prior to testing.

3.03 All fittings supplied shall be appropriately rated for the maximum working pressure of the system.

3.04 Tests: The field test required for approval is to be arranged by the Contractor. All labor covering the field test will be furnished by the Contractor, including hoses and nozzles. The Pump manufacturer's representative is to furnish all required instrumentation, conduct testing to the satisfaction of the owner's representative and all review, inspection and approval authorities, and provide written certification of testing results.

END OF SECTION

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END OF PLUMBING INDEX

SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Piping materials and fittings.
2. Joining materials.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Piping Specialties
6. Grouting
7. Piping Insulation.
8. Equipment Installation.
9. Concrete Bases.
10. Erection of Metal Supports.
11. Erection of Wood Supports
12. Cutting and Patching

B. Related Sections:

1. Section 01 31 00 - Project Management and Coordination
2. Section 01 73 29 - Cutting and Patching
3. Section 01 78 43 - Spare Parts and Materials
4. Section 01 79 00 - Training
5. Section 01 78 23 - Operating and Maintenance Data
6. Section 03 30 00 - Cast-in-Place Concrete
7. Section 06 10 00 - Rough Carpentry
8. Section 07 62 00 - Sheet Metal Flashing and Trim
9. Section 07 84 00 - Firestopping
10. Section 08 31 00 - Access Doors
11. Section 09 90 00 - Painting
12. Section 22 05 53 – Identification for Plumbing Piping and Equipment: Labeling and identifying plumbing systems and equipment.
13. Section 31 20 00 – Earth Moving

1.02 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.

2. CPVC: Chlorinated polyvinyl chloride plastic.

3. PVC: Polyvinyl chloride plastic.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections:

1. Product Data: For dielectric fittings, flexible connectors, plumbing sleeve seals, and identification materials and devices.

2. Coordination Drawings: Detail major elements, components, and systems of plumbing equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:

a. Planned piping layout, including valve and specialty locations and valve-stem movement.

b. Clearances for installing and maintaining insulation.

c. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.

d. Equipment and accessory service connections and support details.

e. Exterior wall and foundation penetrations.

f. Fire-rated wall and floor penetrations.

g. Sizes and location of required concrete pads and bases.

h. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.

i. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

1.04 QUALITY ASSURANCE

A. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting plumbing and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases.

1. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design requirements. See drawings for equipment schedules and requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.06 SEQUENCING AND SCHEDULING

A. Coordinate plumbing equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for plumbing installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of plumbing materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate connection of plumbing systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

F. Coordinate requirements for access panels and doors if plumbing items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Section 08 31 13 - "Access Doors and Frames."

G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

1.07 Posted Operating Instructions

A. Provide and post operating instructions for all plumbing systems.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Dielectric Unions:
   a. Hart Industries, International, Inc. (800-769-0503)
   b. Watts Water Technologies, Inc. (978-688-1811)
   c. Zurn Plumbing Products Group of Jacuzzi Brands, Inc. (805-238-7100)
2. Dielectric Flanges:
   a. Capitol Manufacturing Company, A member of The Phoenix Forge Group (800-848-1100)
   b. Central Plastics Co. (800-654-3872)
   c. Watts Water Technologies, Inc. (978-688-1811)
3. Dielectric-Flange Insulating Kits:
   a. Central Plastics Co. (800-654-3872)
4. Dielectric Couplings:
   a. Lochinvar Corp. (615-889-8900)
5. Dielectric Nipples:

a. Grinnell Mechanical Products, A Tyco International Company (800-500-4768)

b. Perfection Corporation (800-544-6344)

c. Victaulic Co. of America (800-742-5842)

6. Plumbing Sleeve Seals:

a. Metraflex Inc. (800-621-4347)

b. PSI-Thunderline/Link-Seal (800-423-2410)

2.02 PIPE AND PIPE FITTINGS

A. Refer to individual Divisions 22 piping Sections for pipe and fitting materials and joining methods.

1. Section 22 11 16 - Domestic Water Piping.

2. Section 22 13 16 – Sanitary Waste and Vent Piping.

3. Section 22 14 23 – Facility Natural Gas Piping.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.03 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B32.

1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.

2. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.

3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10 percent maximum lead content.

4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10 percent maximum lead content.

5. Alloy Sb5: 95 percent tin and 5 percent antimony, with 0.20 percent maximum lead content.

F. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.

2. BAg1: Silver alloy.

3. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements: Manufacturer's standard solvent cements for the following:

1. ABS Piping: ASTM D2235.
2. CPVC Piping: ASTM F493.
3. PVC Piping: ASTM D2564. Include primer according to ASTM F656.
4. PVC to ABS Piping Transition: ASTM D3138.

H. Plastic Pipe Seals: ASTM F477, elastomeric gasket.

I. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

J. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

1. Sleeve: ASTM A126, Class B, gray iron.
2. Followers: ASTM A47 malleable iron or ASTM A536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.04 DIELECTRIC FITTINGS

A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
2. Insulating Material: Suitable for system fluid, pressure, and temperature.

B. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

C. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150-psig minimum working pressure as required to suit system pressures.

D. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Provide separate companion flanges and steel bolts and nuts for 150-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and non-corrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

2.05 Plumbing Sleeves

A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.
4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
    a. Underdeck Clamp: Clamping ring with set screws.

2.06 PLUMBING SLEEVE SEALS

A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.07 PIPING SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.

1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
2. OD: Completely cover opening.
3. Cast Brass: Split casting, with concealed hinge and set screw.
    a. Finish: Polished chrome-plate.
4. Cast-Iron Floor Plate: One-piece casting.

B. Grout:

1. Non-shrink, Nonmetallic Grout: ASTM C1107, Grade B.
    a. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, non-staining, non-corrosive, nongaseous, and recommended for interior and exterior applications.
    b. Design Mix: 5000-psig, 28-day compressive strength.
    c. Packaging: Premixed and factory packaged.

PART 3 EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping as described below, unless piping Sections specifies otherwise. Individual Division 22 piping Sections specifies unique piping installation requirements.

B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings as required by Division 01 Sections and as outlined in Part 1 of this section.

C. Install piping at indicated slope.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

I. Install piping to allow application of insulation plus 1-inch clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's written instructions.

M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish.
2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
4. Insulated Piping: Cast brass with concealed hinge, set screws, and chrome-plated finish.
5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

N. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
    a. Exception: Extend sleeves installed in floors of plumbing equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping rings where required.
2. Build sleeves into walls and slabs as work progresses.
3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS (DN150).
    b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS (DN150) and larger, penetrating gypsum-board partitions.
4. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Section 07 62 00 "Sheet Metal Flashing and Trim" for flashing.
    a. Seal space outside of sleeve fittings with non-shrink, nonmetallic grout.
5. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealant. Refer to Section 07 92 00 "Joint Sealants" for materials.
6. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

O. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and plumbing sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing plumbing sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
3. Assemble and install plumbing sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

P. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using plumbing sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing plumbing sleeve seals.

1. Assemble and install plumbing sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire stopping materials. Refer to Section 07 84 00 - "Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

T. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to CDA's "Copper Tube Handbook."
4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
    a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
    b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
    c. Align threads at point of assembly.
    d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
    e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
    a. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
    b. CPVC Piping: ASTM D2846 and ASTM F493.
    c. PVC Pressure Piping: ASTM D2672.
    d. PVC Non-pressure Piping: ASTM D2855.
9. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657 procedures and manufacturer's written instructions.
    a. Plain-End Pipe and Fittings: Use butt fusion.

b. Plain-End Pipe and Socket Fittings: Use socket fusion.

U. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.

2. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.02 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights is not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Owner’s Representative.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope as specified in other Division 22 sections.

F. Clearance from Electrical Equipment: Piping is prohibited in electric rooms and closets, elevator machine rooms and installation over transformers, switchboards and motor control centers.

3.03 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psig 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 - "Cast-in-Place Concrete."

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

C. Prime and paint all metal supports per Section 09 90 00 requirements.

3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor plumbing materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.06 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for plumbing installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

C. Refer to Division 01 Sections for additional requirements.

3.07 GROUTING

A. Install nonmetallic, non-shrink, grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placing of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases to provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION

SECTION 22 05 10 - MANUFACTURERS DRAWINGS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall submit to the Associate for review, within two weeks after date of contract, ten (10) copies of manufacturer's drawings, wiring diagrams and data. The Associate will review Contractor's shop drawings and related submittals (as indicated below) with respect to the ability of the detailed work, when complete, to be a properly functioning integral element of the overall system designed by the Associate. Before submitting a shop drawing or any related material to the Associate, Contractor shall: review each such submission for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of Contractor; approve each such submission before submitting it; and so stamp each such submission before submitting it. The Associate shall assume that no shop drawing or related submittal comprises a variation unless Contractor advises Associate otherwise via a written instrument which is acknowledged by Associate in writing. The shop drawings and related material (if any) called for are indicated below:

Plumbing Contract

- Plumbing fixtures and all trim
- Gas Water Heaters
- Domestic Hot Water Storage Tank
- Domestic Hot Water Recirculation Pumps and Circulation Pumps
- Domestic Water Packaged Booster Pumps
- Drains and cleanouts
- Backflow Preventors
- Thermostatic Mixing Valves
- Pressure Reducing Valves
- Piping and Fittings
- Valves

B. The Associate shall return shop drawings and related materials with comments provided that each submission has been called for and is stamped by Contractor as indicated above. The Associate shall return without comment material not called for or which has not been approved by Contractor.

C. This Contractor shall furnish equipment shop drawings which will indicate power hook up and control connections as required for mechanical equipment. "Stock" wiring diagrams are NOT ACCEPTABLE.

D. The manufacturer shall provide a statement on submittals that equipment furnished complies with the Pennsylvania Energy Code. This previously relates to high efficiency motors, EER's, COP's, etc. If this is not done, submittals will be rejected.

E. Associate's review of manufacturer's drawings or schedules shall not relieve the Contractor from compliance with the requirements of the plans and specifications.

F. The Plumbing Contractor is responsible for overlaying his work onto the HVAC Sheetmetal Coordination Drawings and for providing information as to size, elevation and location proposed for all components; and for coordination of his work with that of other Contractors. Final resolution of all items to be determined at project meetings held by Owner's Representative.

1.02 QUANTITIES

A. Items may be referred to in singular or plural on Plans and Specifications. Contractor is responsible for determining quantity of each item.

PART 2 PRODUCTS

2.01 Not Applicable

PART 3 EXECUTION

3.01 Not Applicable

END OF SECTION 22 05 10

SECTION 22 05 13 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Basic Motor Requirements
2. Polyphase Motors
3. Single Phase Motors

B. Related Sections:

1. Division 22 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.

1.03 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Listing and Labeling: Provide motors specified in this Section that are listed and labeled.

1. Terms "Listed and Labeled": As defined in the National Electrical Code, Article 100.

PART 2 PRODUCTS

2.01 BASIC MOTOR REQUIREMENTS

A. Basic requirements apply to mechanical equipment motors, unless otherwise indicated.

B. Motors 1/2 HP and Larger: Polyphase.

C. Motors smaller than 1/2 HP: Single phase.

D. Frequency Rating: 60 Hz.

E. Voltage Rating: Determined by voltage of circuit to which motor is connected.

F. Service Factor: According to NEMA MG 1, general purpose continuous duty, design type “B.”

G. Capacity and Torque Characteristics: Rated for continuous duty and sufficient to start, accelerate, and operate connected loads at designated speeds, in indicated environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

H. Enclosure: Open drip proof, unless otherwise indicated.

I. Efficiency: Motors shall have a higher efficiency rating than industry standard average motor as delineated in IEEE Standard 112, Test Method 13.

2.02 POLYPHASE MOTORS

A. Description: NEMA MG 1, medium induction motor.

1. Design Characteristics: NEMA MG 1, Design B, unless otherwise indicated.
2. Energy-Efficient Design: Where indicated.

3. Stator: Copper windings, unless otherwise indicated. Multispeed motors have separate winding for each speed.
4. Rotor: Squirrel cage, unless otherwise indicated.
5. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.
6. Temperature Rise: Match insulation rating, unless otherwise indicated.
7. Insulation: Class F, unless otherwise indicated.

B. Motors Used with Reduced-Inrush Controllers: Match wiring connection requirements for indicated controller, with required motor leads brought to motor terminal box to suit control method.

C. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Critical vibration frequencies are not within operating range of controller output.
2. Temperature Rise: Match rating for Class B insulation.
3. Insulation: Class H.
4. Thermal Protection: Where indicated, conform to NEMA MG 1 requirements for thermally protected motors.

D. Source Quality Control: Perform the following routine tests according to NEMA MG 1:

1. Measurement of winding resistance.
2. No-load readings of current and speed at rated voltage and frequency.
3. Locked rotor current at rated frequency.
4. High-potential test.
5. Alignment.

2.03 SINGLE-PHASE MOTORS

A. Type: As indicated or selected by manufacturer from one of the following, to suit starting torque and other requirements of specific motor application.

1. Permanent-split capacitor.
2. Split-phase start, capacitor run.
3. Capacitor start, capacitor run.

B. Shaded-Pole Motors: Do not use, unless motors are smaller than 1/20 hp.

C. Thermal Protection: Where indicated or required, internal protection automatically opens power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal protection device automatically resets when motor temperature returns to normal range, unless otherwise indicated.

D. Bearings: Ball-bearing type for belt-connected motors and other motors with high radial forces on motor shaft. Sealed, prelubricated sleeve bearings for other single-phase motors.

PART 3 EXECUTION

3.01 ADJUSTING

A. Use adjustable motor mounting bases for belt-driven motors.

B. Align pulleys and install belts.

C. Tension according to manufacturer's written instructions.

END OF SECTION

SECTION 22 05 17 - FIRESTOPPING

PART 1 GENERAL

1.01 SCOPE

A. Each Contractor shall be responsible for firestopping around all openings for pipes, ducts, conduits, etc., installed by him at all fire walls and smoke walls. Firestopping shall be performed by an installer who has been trained by manufacturer, or manufacturer's representative, in the installation procedures based on published UL tested fire stop systems.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 REFERENCE

A. Division 1 – General Conditions

B. Division 3 – Concrete

C. Division 4 – Masonry

D. Division 9 – Finishes

E. Section 22 05 16 – Sleeves and Collars

F. Section 22 07 00 - Plumbing Insulation

1.04 GENERAL REQUIRMENTS

A. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops" (July 1997).

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:

a. Through-Penetration Firestop Devices (XHCR)

b. Fire Resistance Ratings (BXUV)

c. Through-Penetration Firestop Systems (XHEZ)

d. Fill, Voids, or Cavity Material (XHHW)

e. Forming Materials (XHKU)

C. International Firestop Council Guidelines for Evaluating Firestop Systems Associating Judgments

D. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials.

E. The Pennsylvania Building Code

F. Allenghany County Building Code

G. NFPA 101 - Life Safety Code

1.05 QUALITY ASSURANCE

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E-814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural Associate prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's Associateing judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Associate judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994).

1.06 SUBMITTALS

A. Submit Product Data: Manufacturer’s specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions.

B. Manufacturer's Associateing judgment identification number and drawing details when no UL system is available for an application. Associate judgment must include both project name and contractor’s name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.07 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A manufacturer’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Scheduling

1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 PRODUCTS

2.01 FIRESTOPPING, GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that is needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma, (800)879-8000
2. Tremco Sealants & Coatings, Beachwood, Ohio, (216) 292-5000
3. 3M Fire Protection Products, St. Paul, Minnesota, (612) 736-0203

2.03 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices are installed prior to concrete placement for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device
2. Fox Coupling, Inc. "Cast-In-Place Firestop Coupling".
3. Proset Cast-In-Place Device

C. Sealant or caulking materials for use with non-combustible items including steel pipe & copper pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. 3M Fire Barrier CP25 or Firestop Sealant 2000
3. Tremco Fyre Shield

D. Sealant or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601S Elastomeric Firestop Sealant or CP 606 Flexible Firestop Sealant
2. Tremco Fyre-Shield High Performance Ceramic Firestop Sealant
3. 3M Fire Barrier CP25WB+ or 2000 Silicone Sealant

E. Intumescent sealant or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. 3M Fire Barrier CP25WB+
3. Tremco Intumescent Acrylic or TremStop WBM

F. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti CP 642 and CP643 Firestop Collar, CP645 Wrap Strip
2. Tremco TREMstop D Combustible Pipe Intumescent Device System and TremStop WS Wrap Strip
3. 3M Ultra Plastic Pipe Device and Fire Barrier FS-195+ Wrap Strip

G. Materials used for large size/complex penetrations made to accommodate multiple steel and copper pipes, the following products are acceptable:

1. Hilti FS 635 Trowelable Firestop Compound and FS 657 FIRE BLOCK
2. Tremco TremStop M Fire Rated Mortar and PS Pillows
3. 3M Fire Barrier CS-195+ Composite Sheet

H. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate multiple steel and copper pipes, the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK
2. Tremco PS Firestop Pillows
3. 3M CS Intumescent Sheet

I. Provide a firestop system with an "F" Rating as determined by UL 1479 or ASTM E814. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated.

PART 3 EXECUTION

3.01 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.

5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration joint materials.

C. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

D. Consult with mechanical Associate and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

E. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

1. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas. All penetrations are to be labeled in accordance with the University's standard labeling system. The HVAC Contractor shall coordinate all fire stopping requirements with the University prior to start of work.

2. Keep areas of work accessible until inspection and approval have been completed.

3. All fire stopping shall be inspected and approved by a licensed independent Consultant. All unapproved fire stopping products installed by this contractor will be removed and replaced at his expense.

4. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION 22 05 17

SECTION 22 05 19 - METERS AND GAUGES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Thermometers.
2. Pressure Gages.
3. Water Meters.

B. Related Sections:

1. Section 22 11 23 (15194) - Natural Gas Piping: For gas meters.
2. Division 22 (15) Plumbing Equipment Sections that specify meters and gages as part of factory-fabricated equipment.
3. Section 32 84 00 (02810) - Irrigation Systems: For irrigation water sub-meters outside the buildings.
4. Section 33 00 00 (02500) - Utilities: For water meters outside the building.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: Include scale range, ratings, and calibrated performance curves for each meter, gage, fitting, specialty and accessory specified.
   a. Include scale range, ratings, and calibrated performance curves for each meter, gage, fitting, specialty, and accessory specified.
2. Shop Drawings: Include schedule indicating manufacturer's number, scale range, fittings, and location for each meter and gage.
3. Product Certificates: Signed by manufacturers of meters and gages certifying accuracies under specified operating conditions and compliance with specified requirements.
4. Maintenance Data: For meters and gages to include in maintenance manuals specified in Division 01. Include data for the following:
   a. Flow-measuring systems.
   b. Flow meters.
   c. Water meters.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Liquid-in-Glass Thermometers:
   a. Ashcroft, Inc.
   b. Marsh Bellofram (800-727-5646)
   c. Weiss Instruments, Inc. (631-207-1200)
2. Pressure Gages:
   a. Ashcroft, Inc.

b. Marsh Bellofram (800-727-5646)

c. Weiss Instruments, Inc. (631-207-1200)

3. Water Meters and Submeters:

a. As required by the local authority having jurisdiction.

2.02 THERMOMETERS, GENERAL

A. Scale Range: Temperature ranges for services listed are as follows:

1. Domestic Hot and Cold Water: 30 to 240 deg F, with 2-degree scale divisions.

B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

2.03 THERMOMETERS - LIQUID-IN-GLASS

A. Description: ASTM E1-03a.

B. Case: Die cast and aluminum finished in baked-epoxy enamel, glass front, spring secured, 9 inches long.

C. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.

D. Tube: Red or blue reading, mercury filled with magnifying lens.

E. Scale: Satin-faced nonreflective aluminum with permanently etched markings.

F. Stem: Brass for separable socket; of length to suit installation.

2.04 PRESSURE GAGES

A. Description: ASME B40.100, phosphor-bronze bourdon-tube type with bottom connection; dry type, unless liquid-filled-case type is indicated.

B. Case: Drawn steel, brass, or aluminum with 4-1/2-inch- diameter, glass lens.

C. Connector: Brass, NPS 1/4 (DN8).

D. Scale: White-coated aluminum with permanently etched markings.

E. Accuracy: Grade A, plus or minus 1 percent of middle 50 percent of scale.

F. Range: Comply with the following:

1. Fluids under Pressure: Two times the operating pressure (or 0 to 160 psi).

2.05 PRESSURE-GAGE FITTINGS

A. Valves: NPS 1/4 (DN8) brass needle type with round knurled handle.

B. Snubbers: ASME B40.5, NPS 1/4 (DN8) extended stem brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.06 WATER METERS AND SUB-METERS

A. Water Meter shall be provided as required by the local authority having jurisdiction.

B. Provide and install sub-meter for site irrigation system.

C. Description: AWWA C700-02, displacement type, bronze case. Registers flow in gallons (liters) or cubic feet (cubic meters) as required by utility.

D. Description: AWWA C701-02, turbine type. Registers flow in gallons (liters) or cubic feet (cubic meters) as required.

PART 3 EXECUTION

3.01 INSTALLATION - METER AND GAGE, GENERAL

A. Install meters, gages, and accessories according to manufacturer's written instructions for applications where used.

3.02 INSTALLATION - THERMOMETER

A. Install thermometers and adjust vertical and tilted positions.

B. Install in the following locations:

1. Domestic hot water supply main (downstream of storage tank).
2. Domestic hot water return main.
3. Domestic hot water storage tank.
4. Domestic water heater discharge.
5. Building domestic cold water service entrance.

3.03 INSTALLATION - PRESSURE-GAGE

A. Install pressure gages in piping tees with pressure-gage valve located on pipe at most readable position.

B. Install dry-type pressure gages in the following locations:

1. Upstream and downstream of each pressure-reducing valve.
2. Building water-service entrance.

C. Install liquid-filled-type pressure gages at suction and discharge of each pump.

D. Install pressure-gage needle valve and snubber in piping to pressure gages.

3.04 INSTALLATION - WATER METER

A. Install water meters, piping, and specialties according to AWWA M6 and utility's requirements.

1. Install displacement-type water meters with shutoff valve on water meter inlet. Install valve on water meter outlet and valved bypass around meter, unless prohibited by authorities having jurisdiction.
2. Install compound-type water meters with shutoff valves on water meter inlet and outlet and on valved bypass around meter. Support meters, valves, and piping on brick or concrete piers.
3. Install detector-type water meters with shutoff valves on water meter inlet and outlet and on full-size valved bypass around meter. Support meter, valves, and piping on brick or concrete piers.

B. Rough-In

1. Install roughing-in piping and specialties for domestic water and/or site irrigation water meter installation according to utility's instructions and requirements.
2. See Section 22 11 16 for domestic water piping requirements.

3.05 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties. The following are specific connection requirements:

1. Install meters and gages adjacent to equipment to allow service and maintenance.

B. Make electrical connections to power supply and electrically operated meters and devices.

C. Ground electrically operated meters.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

D. Install electrical connections for power and devices.

E. Electrical power, wiring, and connections are specified in Division 26 Sections.

3.06 ADJUSTING AND CLEANING

A. Calibrate meters according to manufacturer's written instructions, after installation.

B. Adjust faces of meters and gages to proper angle for best visibility.

C. Clean windows of meters and gages and clean factory-finished surfaces. Replace cracked and broken windows, and repair scratched and marred surfaces with manufacturer's touchup paint.

END OF SECTION

SECTION 22 05 23 - GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Valves.

B. Related Sections:

1. Section 22 05 53 – Identification for Plumbing Piping and Equipment: For valve tags and charts.

2. Division 22 Plumbing Piping System Sections: Special purpose valves

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data for each valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Include list indicating valve and its application.

2. Maintenance data for valves to include in the operation and maintenance manual specified in Division 01. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

1.03 QUALITY ASSURANCE

A. Single-Source Responsibility: Comply with the requirements specified in Division 01. Provide all valves of the same manufacturer where possible.

1. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.

B. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.

2. Protect threads, flange faces, grooves, and weld ends.

3. Set globe and gate valves closed to prevent rattling.

4. Set ball and plug valves open to minimize exposure of functional surfaces.

5. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.

2. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use a sling to handle large valves. Rig to avoid damage to exposed parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Ball Valves and Gate Valves:

a. Hammond Valve Corporation (800-348-6544)

b. Milwaukee Valve Company, Inc. (262-432-2700)

c. NIBCO Inc. (574-295-3000)

2. Balancing Valves:

a. Victaulic Company (800-742-5842)

b. Hays Fluid Controls, A Romac Industries, Inc. Company (800-354-4297)

3. Check Valves:

a. Hammond Valve Corporation (800-348-6544)

b. Milwaukee Valve Company, Inc. (262-432-2700)

c. NIBCO Inc. (574-295-3000)

2.02 GENERAL

A. Design: Rising stem or rising outside screw and yoke stems, except as specified below.

1. Nonrising stem valves may be used only where headroom prevents full extension of rising stems.

B. Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Use specified operators and handwheels, except provide the following special operator features:

1. Handwheels: For valves other than quarter turn.

2. Lever Handles: For quarter-turn valves 6 inches (DN150) and smaller, except for plug valves, which shall have square heads. Furnish Owner with 1 wrench for every 10 plug valves.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

G. Threads: ASME B1.20.1.

H. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.

I. Solder Joint: ASME B16.18.

1. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.

2.03 BALL VALVES

A. Ball Valves, 4 Inches (DN100) and Smaller: MSS SP-110, Class 150, 600-psi CWP, ASTM B584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2-inch (DN15) valves and smaller and conventional port for 3/4-inch (DN20) valves and larger; blowout proof; bronze or brass stem; Teflon seats and seals; threaded or soldered end connections:

1. Operator: Vinyl-covered steel lever handle.
2. Stem Extension: For valves installed in insulated piping.
3. Memory Stop: For operator handles (balancing valves).

2.04 GATE VALVES

A. Gate Valves, 2-1/2 Inches (DN65) and Smaller: MSS SP-80; Class 125, 200-psi cold working pressure (CWP), ASTM B62 cast-bronze body and bonnet, solid-bronze wedge, copper-silicon alloy rising stem, Teflon-impregnated packing with bronze packing nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.

B. Gate Valves, 3 Inches (DN80) and Larger: MSS SP-70, Class 125, 200-psi CWP, ASTM A126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, Teflon-impregnated packing with 2-piece packing glad assembly, flanged end connections; and with cast-iron handwheel.

2.05 BALANCING VALVES

A. Calibrated Balancing Valves: Adjustable, with 2 readout ports and memory setting indicator. Include manufacturer's standard hoses, fittings, valves, differential pressure meter, and carrying case.

1. 2-inch NPS (DN50) and Smaller: Bronze body with brass ball, adjustment knob, calibrated nameplate, and threaded or solder-joint ends.
2. 2-inch NPS (DN500 and Smaller: Bronze, Y-pattern body with adjustment knob and threaded ends.

B. Memory-Stop Balancing Valves, 2-Inch NPS (DN50) and Smaller: MSS SP-110, ball valve, rated for 400-psig minimum CWP. Include 2-piece, ASTM B62 bronze body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, solder-joint ends, and vinyl-covered steel handle with memory-stop device.

C. Automatic Flow Control Valves (AFCV): Automatic flow control valves shall be factory set to rated flow, and shall automatically control the flow to within 10% of the rated value, over a 40 to 1 differential pressure, operating range, (2 to 80 PSID). Operational temperature shall be rated from fluid freezing, to 225 degree F.

1. "MESURFLO" by Hays Fluid Controls, or approved substitution by listed manufacturers.
   a. Automatic Flow Control valve body shall be constructed of hot forged brass UNS C37700 or C36000 per ASTM B283 latest revision, ductile iron per ASTM A395, valve grade cast iron per ASTM B209, or UNS C84400 Cast Semi-Red Brass with inch size pipe thread fittings per ASME B1.20.1, and B31.9. UNS C37700 and UNS C36000 valve bodies are suitable for 600 PSIG Iron, and Cast Brass valve bodies are suitable for 400 PSIG. Working Pressure rating per ASTM A53 threaded joint type. Valve body shall also be available with sweat fittings per ASME B16.22 requirements and are intended for use in Building Services Piping meeting the requirements of ASME B31.9. The Temperature/Pressure Rating of the Solder Joint is dependent upon the type of solder used. ASME Standard B16.22 Pressure Ratings should be reviewed prior to sweating.
2. "Y-BALL MESURFLO" by Hays Fluid Controls, or approved substitution by listed manufacturers:

a. Ball Valve, combination Automatic Flow Control Valves, shall be made of hot forged brass UNS C37700 per ASTM B283 Latest Revision, using full flow design balls, blowout proof stems, and shall be rated for 600 PSIG WOG.

b. Copper Sweat fittings 1/2, 3/4, 1 & 1 1/4, INCH shall be suitable for 522 PSIG. Working Pressure Rating per ASME B31.9 Building Services Piping.

c. Threaded fittings 1/2, through 1 1/2 INCH shall be suitable for 600 PSIG. Working Pressure Rating per ASTM A53B for threaded joint type extra weight, of the pipe size indicated. (For most Building Services applications, ANSI Class 125 rating.) Flow rates from .5 to 24.0 GPM will have a differential pressure operating range of 2 to 80 PSID. Flow rates shall be field changeable without breaking the piping connections.

3. Valve internal control mechanism shall be of a quiet, clog resistant design and consist of one or more, precision sculptured brass or polyphenylsulfone with high temperature elastomeric diaphragm. Each automatic balancing valve will automatically control the flow rate within 10% of its rated flow, over a temperature range of 32 to 225 degree F, and a pressure differential range of 2-80 PSID. Flow increments shall be available in 0.125 to 0.5 GPM steps for 0.5 to 8.0 GPM, 1.0 to 2.0 GPM steps for 9.0 to 24 GPM, and 5.0 GPM steps for 25 to 200 GPM.

4. Dual pressure/temperature test ports for verifying the pressure differential and system temperature shall be standard.

5. Manufacturer shall provide certified independent laboratory tests verifying accuracy of performance.

6. All valves shall be marked per MMS-SP-25-78 (1983) and shall show as a minimum; controlled flow direction, flow rate, PSID control range, manufacturer and model number.

2.06 CHECK VALVES

A. Swing Check Valves, 2-1/2 Inches (DN65) and Smaller: MSS SP-80; Class 125, 200-psi CWP, or Class 150, 300-psi CWP; horizontal swing, Y-pattern, ASTM B62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded or soldered end connections:

B. Swing Check Valves, 3 Inches (DN80) and Larger: MSS SP-71, Class 125, 200-CWP, ASTM A126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

F. Do not attempt to repair defective valves; replace with new valves.

3.02 INSTALLATION

A. Install valves as indicated, according to manufacturer's written instructions.

B. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.

C. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.

D. Locate valves for easy access and provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the center of the pipe and in a position to allow full stem movement.

F. Installation of Check Valves: Install for proper direction of flow as follows:

1. Swing Check Valves: Horizontal position with hinge pin level.

G. Sectional Valves: Install sectional gate or ball valves closest to main on each branch and riser serving plumbing fixtures or equipment, and where indicated.

H. Shutoff Valves: Install gate or ball shutoff valve on each water supply to equipment, on each supply to plumbing fixtures without supply stops, and where indicated.

I. Drain Valves: Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

1. Install hose-end drain valves with cap and chain at low points in water mains, risers, and branches.

2. Install stop-and-waste drain valves where indicated.

J. Balancing Valves: Install in each hot-water circulation return branch, discharge side of each pump and circulator, and where indicated.

3.03 SOLDERED CONNECTIONS

A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Open gate and globe valves to fully open position.

E. Remove the cap and disc holder of swing check valves having composition discs.

F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

G. Apply heat evenly to outside of valve around joint until solder melts on contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.04 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.05 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.06 VALVE END SELECTION

A. Select valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size, 2-1/2 Inches (DN65) and Smaller: Solder ends.

2. Steel Pipe Sizes, 2-1/2 Inches (DN65) and Smaller: Threaded or grooved end.

3. Steel Pipe Sizes, 3 Inches (DN80) and Larger: Grooved end or flanged.

3.07 APPLICATION SCHEDULE

A. General Application: Use gate and ball, valves for shutoff duty; globe and ball for throttling duty. Refer to piping system Specification Sections for specific valve applications and arrangements.

B. Domestic Water Systems: Use the following valve types:

1. Ball Valves: Class 150, 600-psi CWP, with stem extension.

C. Domestic Hot Water Recirculation Systems: Use the following valve types:

1. Balancing Valves: Automatic or adjustable Ball valves with readout ports.

3.08 ADJUSTING

A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Hangers and Supports for Plumbing System Piping and Equipment.

B. Related Sections:

1. Section 05 50 00 - Metal Fabrications
2. Section 09 90 00 - Painting
3. Section 21 10 00 - Fire Suppression Systems
4. Section 22 05 48 – Vibration and Seismic Control for Plumbing Piping and Equipment

1.02 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) with the following supporting data:

1. Product Data:

a. For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

1.04 QUALITY ASSURANCE

A. Engineering Responsibility: Where required by the local authority having jurisdiction design and preparation of Shop Drawings and calculations for each multiple pipe support, trapeze, and seismic restraint by a qualified professional engineer.

1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Pipe Hangers, Supports, and Components:

a. None

2. Channel Support Systems:

a. None

3. Thermal-Hanger Shield Inserts:

a. None

4. Powder-Actuated and Mechanical Anchor Fastener Systems:

a. None

B. Approved Manufacturers:

1. Pipe Hangers, Supports, and Components:

a. Cooper B-Line, Inc. (618-654-2184)

b. Grinnell Mechanical Products, A Tyco International Company (800-500-4768)

c. National Pipe Hanger Corporation (609-261-5353)

2. Channel Support Systems:

a. Cooper B-Line, Inc. (618-654-2184)

b. Grinnell Mechanical Products, A Tyco International Company (800-500-4768)

c. National Pipe Hanger Corporation (609-261-5353)

3. Thermal-Hanger Shield Inserts:

a. Carpenter & Patterson, Inc. (301.333.4631)

b. Erico (Michigan Hanger) (440-248-0100)

c. PHS Industries, Inc. (800-626-2336)

4. Powder-Actuated and Mechanical Anchor Fastener Systems:

a. Gunnebo Fastening Corp. (800-336-1640)

b. Hilti, Inc.(800-879-8000)

c. ITW Ramset/Red Head (800-899-7890)

2.02 HANGERS AND SUPPORTS

A. Pipe Hangers, Supports, and Components:

1. MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

a. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.

b. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

B. Channel Support Systems:

1. MFMA-2, factory-fabricated components for field assembly.

2. Coatings: Manufacturer's standard finish.

3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

C. Thermal-Hanger Shield Inserts:

1. 100-psi minimum compressive-strength insulation, encased in sheet metal shield.

2. Material for Cold Piping: ASTM C552, Type I cellular glass.

3. Material for Hot Piping: ASTM C552, Type I cellular glass.

4. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.

5. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.

6. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.03 MISCELLANEOUS MATERIALS

A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

C. Structural Steel: ASTM A36, steel plates, shapes, and bars, black and galvanized.

D. Grout: ASTM C1107, Grade B, factory-mixed and -packaged, non-shrink and nonmetallic, dry, hydraulic-cement grout.

1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.

2. Properties: Nonstaining, noncorrosive, and nongaseous.

3. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 EXECUTION

3.01 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.

2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24 if little or no insulation is required.

3. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 to allow off-center closure for hanger installation before pipe erection.

4. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

5. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

6. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.

7. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.

8. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).

E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.

F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.

2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

3. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

4. C-Clamps (MSS Type 23): For structural shapes.

5. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

a. Light (MSS Type 31): 750 lb.

b. Medium (MSS Type 32): 1500 lb.

G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.

2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

3.02 HANGER AND SUPPORT INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.

1. Field assemble and install according to manufacturer's written instructions.

C. Install building attachments to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.

D. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

J. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.
    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits according to ASME B31.9.
2. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.
4. Shield Dimensions for Pipe: Not less than the following:
    a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches long and 0.048 inch thick.
    b. NPS 4 (DN100): 12 inches long and 0.06 inch thick.
5. Insert Material: Length at least as long as protective shield.

3.03 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Prime and Paint Equipment Supports as specified in Section 09 90 00 “Painting”.

3.04 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.05 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments, to level equipment, and to achieve indicated slope of pipe.

3.06 PAINTING

A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 09 90 00 “Painting”.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION

SECTION 22 05 48 - VIBRATION AND SEISMIC CONTROL FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Vibration Isolators.
2. Seismic Controls.
3. Vibration Isolation Bases.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 09 90 00 - Painting
3. Section 22 05 00 – Common Work Results for Plumbing
4. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: for pipe hanger restraints.
5. Division 22 Piping Sections for flexible pipe connectors.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data: Indicate types, styles, materials, and finishes for each type of isolator specified. Include load deflection curves.
2. Shop Drawings: Show designs and calculations, certified by a professional engineer, as required by the local authority, for the following:
   a. Design Calculations: Calculations for selection of vibration isolators, design of vibration isolation bases, and selection of seismic restraints.
   b. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to the structure and to the supported equipment. Include auxiliary motor slides and rails, and base weights.
   c. Seismic Restraint Details: Detail fabrication and attachment of restraints and snubbers.

1.03 PROJECT CONDITIONS

A. Project seismic zone is 1 with a zone factor of 0.075.

B. Project seismic zone is 2A with a zone factor of 0.15.

C. Project seismic zone is 2B with a zone factor of 0.20.

D. Project seismic zone is 3 with a zone factor of 0.30.

E. Building Importance Factor: [1.5].

1.04 COORDINATION

A. Coordinate layout and installation of vibration isolation and seismic-restraint devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

B. Coordinate size and location of concrete housekeeping and vibration isolation bases. Cast anchor-bolt inserts into base. Concrete, reinforcement, and formwork requirements are specified in Division 03 Sections.

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Sections.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Cooper B-Line Systems, Inc. (800-851-7415)
2. Kinetics Noise Control, Inc. (877-457-2695)
3. Mason Industries, Inc. (631-348-0282)

2.02 VIBRATION ISOLATORS

A. Isolator Pads: Oil and water resistant and factory cut to sizes that match requirements of the equipment supported.

1. Rubber Isolator Pads: Elastomer (neoprene or silicone) arranged in single or multiple layers and molded with a nonslip pattern and steel baseplates of sufficient stiffness to provide uniform loading over the pad area.
2. Load Range: From 10 to 50 psig and a deflection not less than 0.08 inch per 1 inch of thickness. Do not exceed a loading of 50 psig.

B. Rubber Isolator Mounts: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements, with encapsulated top- and baseplates. Factory-drilled and tapped top plate for bolted equipment mounting. Factory-drilled baseplate for bolted connection to structure. Color-code to indicate capacity range.

C. Spring Isolators: Freestanding, laterally stable, open-spring-type isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 1.2 times the rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to a 1/4-inch- thick, rubber isolator pad attached to the baseplate underside. Size baseplates to limit floor loading to 100 psig.
6. Top Plates: Provide threaded studs for fastening and leveling equipment.
7. Finishes: Manufacturer's standard corrosive-resistant finish.

D. Restrained Spring Isolators: Vertically restrained, freestanding, laterally stable, steel open-spring-type isolators.

1. Housing: Welded steel with resilient vertical limit stops to prevent spring extension due to wind loads or when weight is removed. Factory-drilled baseplate for bolting to structure and bonded to a 1/4-inch thick, rubber isolator pad attached to the baseplate underside. Provide adjustable equipment mounting and leveling bolt.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 0.8 times the rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Finishes: Baked enamel for metal components on isolators for interior use. Hot-dip galvanized for metal components on isolators for exterior use.

E. Rubber Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to formed-steel housings with threaded connections for hanger rods. Color-code to indicate capacity range.

F. Spring Hangers: Combination spring and elastomeric hanger with coil spring and elastomeric insert in compression.

1. Frame: Formed steel, fabricated for connection to threaded rods and to allow for 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
5. Finishes: Baked enamel for metal components. Color-code to indicate capacity range.

2.03 SEISMIC CONTROLS

A. Thrust Restraints: Combination spring and elastomeric restraints with coil spring and elastomeric insert in compression. Factory set for thrust.

1. Frame: Formed steel, fabricated for connection to threaded rods and to allow for 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
5. Finishes: Baked enamel for metal components. Color-code to indicate capacity range.

B. Manufactured Seismic Snubbers: All-directional, double-acting snubbers.

1. Construction: Interlocking steel members restrained by a 3/4-inch thick, replaceable, shock-absorbing neoprene insert. Maintain 1/8-inch clearance in all directions between rigid and resilient surfaces.

C. Fabricated Seismic Snubbers: Welded structural-steel shapes designed and fabricated to restrain equipment or vibration isolation bases from excessive movement during a seismic event. Design to resist gravity forces identified by authorities having jurisdiction.

1. Construction: Welded steel shapes conforming to ASTM A36.
2. Resilient Components: 3/4-inch thick, replaceable, shock-absorbing neoprene insert.

2.04 VIBRATION ISOLATION BASES

A. Fabricated Steel Bases: Structural-steel bases and rails designed and fabricated by the isolation equipment manufacturer. Include equipment static loadings, power transmission, component misalignment, and cantilever loadings.

1. Fabricate bases to shapes required, with welded structural-steel shapes, plates, and bars conforming to ASTM A36. Include support brackets to anchor base to isolation units. Include prelocated equipment anchor bolts and auxiliary motor slide bases or rails.
2. Design and fabricate bases to result in the lowest possible mounting height with not less than 1-inch clearance above the floor.
3. Weld steel angles on frame for outrigger isolation mountings, and provide for anchor bolts and equipment support.
4. Factory Finish: Manufacturer's standard corrosive-resistant finish.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install and anchor vibration-, sound-, and seismic-control products according to manufacturer's written instructions and authorities having jurisdiction.

B. Anchor interior mounts, isolators, hangers, and snubbers to vibration isolation bases. Bolt isolator baseplates to structural floors as required by authorities having jurisdiction.

C. Anchor exterior mounts, isolators, hangers, and snubbers to vibration isolation bases. Bolt isolator baseplates to structural supports as required by authorities having jurisdiction.

D. Install pipe connectors at connections for equipment supported on vibration isolators.

3.02 SEISMIC CONTROL

A. Snubbers: Install the required number of seismic snubbers on each spring-mounted piece of equipment. Locate snubbers as close as possible to the vibration isolators and bolt to supporting structure.

ADJUSTING AND CLEANING

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operations.

C. Adjust thrust restraints for a maximum of 1/4 inch of movement at start and stop

END OF SECTION

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Identifying Devices and Labels for Plumbing Piping and Equipment
2. Section 22 05 00 – Common Work Results for Plumbing

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For identification materials and devices.
2. Samples: Of color, lettering style, and graphic representation required for each identification material and device.

1.03 QUALITY ASSURANCE

A. Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.

1.04 SEQUENCING AND SCHEDULING

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 GENERAL

A. General: Products specified are for applications referenced in other Division 22 Sections. If more than single type is specified for listed applications, selection is Installer's option.

B. Pipes Including Insulation: Full-band pipe markers, extending 360 degrees around pipe at each location.

2.02 IDENTIFYING DEVICES AND LABELS

A. Lettering and Graphics:

1. Utilize manufacturer's standard preprinted captions as selected by Owner's Representative.
2. Coordinate names, abbreviations, and other designations used in plumbing identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of plumbing systems and equipment.
    a. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.
3. Use piping system terms indicated and abbreviate only as necessary for each application length.
    a. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.

B. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils thick.

1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
2. Color: Comply with ASME A13.1, unless otherwise indicated.

C. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.

1. Material: 0.032-inch thick, polished brass.
2. Size: 1-1/2-inches diameter, unless otherwise indicated.

D. Valve Tag Fasteners: Brass, wire-link chain and S-hooks.

E. Access Panel and Equipment Markers: 1/16-inch thick, engraved plastic-laminate markers, with abbreviated terms and numbers corresponding to concealed valve and equipment identification corresponding to schedules on Drawings. Provide 1/8-inch center hole for attachment.

F. Valve Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include screws.

1. Frame: Extruded aluminum.
2. Glazing: ASTM C1036, Type I, Class 1, Glazing quality B, 2.5-mm, single-thickness glass.

PART 3 EXECUTION

3.01 LABELING AND IDENTIFYING PIPING SYSTEMS

A. Install pipe markers on each system as indicated below. Include arrows showing normal direction of flow.

1. Domestic Cold Water.
2. Domestic Hot Water.
3. Domestic Hot Water Return.
4. Sanitary Drain.
5. Storm Drain.
6. Condensate.
7. Vent.

B. Marker Type: Plastic markers, with application systems. Install on pipe insulation segment where required for hot, noninsulated pipes.

C. Fasten markers on pipes and insulated pipes by one of following methods:

1. Snap-on application of pretensioned, semirigid plastic pipe marker.

D. Locate pipe markers where piping is exposed in machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations according to the following:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
3. Near penetrations through walls, floors, ceilings, or nonaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.
6. Spaced at a maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.02 VALVE TAGS

A. Install on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule.

B. Valve Tag Application Schedule: Tag valves according to size, shape, color scheme, and with captions similar to those indicated in the following:

1. Domestic Cold Water
2. Domestic Hot Water
3. Domestic Hot Water Return
4. Gas

C. Tag Material: Brass.

D. Tag Size and Shape: According to the following:

1. Cold Water: 1-1/2 inches round.
2. Hot Water: 1-1/2 inches round.
3. Gas: 1-1/2 inches round.

E. Install framed valve schedule in each major mechanical equipment room.

F. Valve schedule and tag locations shall be shown on record drawings.

3.03 LABELING AND IDENTIFYING PLUMBING EQUIPMENT.

A. Label all plumbing equipment with designations as indicated in plumbing equipment schedules on Drawings.

3.04 ADJUSTING AND CLEANING

A. Relocate plumbing identification materials and devices that have become visually blocked by work of this or other Divisions.

B. Clean faces of identification devices and glass frames of valve charts.

END OF SECTION

SECTION 22 05 93 - TESTS AND ADJUSTMENTS

PART 1 GENERAL

1.01 SCOPE

A. After work has been completed but before pipe covering has been applied, the Contractor shall test and adjust the systems he has installed.

B. Owner's representative shall be notified of all scheduled tests and adjustments at least 48 hours before they are scheduled so that he may witness same. If the Contractor performs any test or adjustment without the owner's representative present or without properly notifying the owner's representative, the Contractor will be required to perform the test or adjustment a second time in the presence of the owner's representative.

C. If owner's representative determines that any work requires special inspection, testing, or approval, they will, upon written authorization, instruct the Contractor to order such special inspection, testing or approval. The Contractor shall give timely notice so the owner's representative may observe the inspections, tests or approvals. If such special inspection or testing reveals a failure of the work to comply with the requirements of the Contract Documents, the Contractor shall bear all costs thereof, including compensation for the engineer's additional services made necessary by such failure; otherwise owner shall bear such costs, and an appropriate Change Order shall be issued.

D. Concealed lines shall be tested before being concealed. If this is not done and a leak appears during the final test, this Contractor shall repair leak and all damage resulting therefrom.

E. This Contractor shall adjust all his equipment in the mechanical system to obtain proper operation and shall demonstrate to owner's representative that the entire system will function properly.

PART 2 PRODUCTS

2.01 Not Applicable

PART 3 EXECUTION

3.01 After work has been completed but before pipe covering has been applied, the Contractor shall test the systems as follows. At these pressures, the circulation shall be free and the piping free of leaks.

System	Test Medium	Pressure Not Less Than	Time Not LessThan	Notes
Water lines	Water	125 lbs	6 hrs	no drop
Drainage systems	In accordance with applicable plumbing codes			

3.02 This Contractor shall adjust all equipment in the mechanical system to obtain proper operation and shall demonstrate to University and the Associate that the entire system will function properly.

END OF SECTION 22 05 93

SECTION 22 05 94 - PROTECTION AND CLEANING

PART 1 GENERAL

1.01 Not Applicable

PART 2 PRODUCTS

2.01 Not Applicable

PART 3 EXECUTION

3.01 Protect all mechanical equipment against damage from any cause whatsoever and pay the cost of replacing and repairing equipment made necessary by failure to provide suitable protection.

3.02 After all piping, equipment and ductwork has been approved and after all plastering has been completed, bare piping and insulation provided under this Contract shall be thoroughly cleaned of dirt, grease, rust and oil.

3.03 Repair all dents and scratches in factory prime or finish coats on all mechanical equipment to the satisfaction of University. If damage is excessive, replacement may be required.

3.04 Flush out all piping systems to remove all dirt and grease from pipes and equipment before systems are placed in operation. Clean strainers after each flushing until the strainer remains clean.

3.05 Cover all motors, fans, pumps, open pipes, etc., to keep out dirt, water and weather during construction.

3.06 This Contractor shall clean up and remove all debris from the site and shall at all times keep the premises in a neat and orderly condition.

3.07 In addition to the provisions and stipulation of the General Conditions, this Contractor and his Subcontractors shall provide various types of protection as follows:

A. Protect finished floors from chips and cutting oil by the use of metal drip receiving pan and oil proof floor cover.

B. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.

C. Protect equipment and finished surfaces from paint droppings, insulation adhesive and sizing droppings, etc., by use of drop cloths.

3.08 All equipment shall be stored at the site with openings, bearings, etc., covered to exclude dust and moisture. All stock piled pipe shall be placed on dunnage and protected from weather and from entry of foreign material.

3.09 Conduit and construction openings and excavations required for Plumbing work shall be covered when work is not in progress, as follows:

A. Cap pipe openings with fittings or plugs.

B. Cover wall and ceiling openings with plywood, or canvas covered framing.

C. Cover floor openings and excavations with structural material of adequate strength to support traffic.

3.10 The Owners property and the property of other Contractors shall be scrupulously respected at all times (including damage from leaks). Provide drop cloths and visqueen or similar barriers where dust and debris is generated, to protect adjacent areas.

3.11 Contractor shall be held responsible for damage caused by his work or through neglect of his workmen. Repairing of damaged work shall be done by Contractor as directed by the owner's representative. Cost of repairs shall be paid by Contractor.

3.12 The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Contractor's guarantee bond not relieving the Contractor of his responsibilities during the bonding period.

3.13 Exercise care in cleaning and lubrication of bearings after equipment has been subjected to prolonged periods of storage before operating the Contractor shall be responsible for continued lubrication of equipment until acceptance of this work.

END OF SECTION 22 05 94

SECTION 22 05 95 - FLUSHING AND STERILIZATION

PART 1 GENERAL

1.01 SCOPE

A. Flush out all domestic water piping systems to remove all dirt and grease from pipes and equipment before systems are placed into operation. Clean strainers after each flushing until the strainer remains clean.

B. After domestic water lines are all installed, sterilize lines, including outside services as prescribed by AWWA-C-651. Sterilization shall be done under the immediate on the job supervision of a water testing laboratory regularly engaged in the service and shall be done per their instructions. All fees for testing and test equipment shall be paid by this Contractor.

C. Furnish a Certificate of Sterilization and Approval For Human Consumption signed by a Professional Engineer registered in the State of Pennsylvania regularly in the employ of the Testing Laboratory. Certification shall be furnished to the Associate and University before payment will be made.

PART 2 PRODUCTS

2.01 Sterilization: Chlorinating material either liquid chlorine meeting AWWA Standard B30l, sodium or calcium hypochlorite meeting AWWA Standard B300.

PART 3 EXECUTION

3.01 With all outlets closed, fill system to working pressure and close valve at supply main.

3.02 A cleaning solution containing not less than 150 parts per million of chlorine shall be introduced into the system.

3.03 Each outlet, hot and/or cold, shall be tested during fill to prove the presence of chlorine at that outlet and valves and faucets shall be opened and closed several times during the disinfecting time period.

3.04 Water piping systems shall remain filled for a period of 24 hours and each outlet shall be again tested and shall produce not less than 100 parts per million of chlorine at the end of the retention period.

3.05 All outlets shall be opened wide and the main supply valves opened, flushing system with water until chlorine content is not greater than 0.2 parts per million or until approved by the Health Department. Flush drain valves.

3.06 After final flushing all aerators on plumbing brass shall be removed, cleaned and reinstalled.

3.07 Sterilization test may be performed at the same time the pressure test is placed on the system.

END OF SECTION 22 05 95

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Insulation Materials
2. Jackets
3. Accessories and Attachments
4. Vapor Retarders

B. Related Sections:

1. Section 07 84 00 - Firestopping: Firestopping materials and requirements for penetrations through fire and smoke barriers.
2. Section 00 43 10 – Break Out Pricing
3. Section 01 21 00 - Allowances
4. Section 01 23 00 - Alternates
5. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: For pipe insulation shields and protection saddles.

C. Drain piping will be insulated as follows:

1. All sanitary and storm drains above public spaces
2. Storm drains within attic space.

D. Only water piping main distribution lines within main corridors and mechanical rooms will be insulated.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.
2. Shop Drawings:
   a. Submit Manufactures data for each type of insulation used.
   b. Application of field-applied jackets.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or similar industry recognized craft training program.

B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

1.04 STORAGE, AND HANDLING

A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.05 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Section 22 05 29 - "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for insulation application.

C. Coordinate installation and testing of electric heat tracing.

1.06 SCHEDULING

A. Schedule insulation application after testing piping systems and, where required, after installing and testing heat-trace tape. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Mineral-Fiber Insulation:

a. CertainTeed Corp. (610-647-3011)

b. Knauf Insulation. (800-825-4434)

c. Owens-Corning Fiberglas Corp. (800-447-3759)

2.02 INSULATION MATERIALS

A. Mineral-Fiber Insulation:

1. Glass fibers bonded with a thermosetting resin complying with the following:

a. Preformed Pipe Insulation: Comply with ASTM C547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.

b. Blanket Insulation: Comply with ASTM C553, Type II, without facing.

c. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:

1) Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.

2) Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.

d. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.

e. Mineral-Fiber Insulating Cements: Comply with ASTM C195.

f. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C196.

g. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.

B. Prefabricated Thermal Insulating Fitting Covers:

1. Comply with ASTM C450 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

2.03 FIELD-APPLIED JACKETS

A. General: ASTM C921, Type 1, unless otherwise indicated.

B. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

C. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.

1. Adhesive: As recommended by insulation material manufacturer.

2. PVC Jacket Color: White or gray.

3. PVC Jacket Color: Color-code piping jackets based on materials contained within the piping system.

D. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil-thick, high-impact, ultraviolet-resistant PVC.

1. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.

2. Adhesive: As recommended by insulation material manufacturer.

2.04 ACCESSORIES

A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd.

1. Tape Width: 4 inches.

2.05 VAPOR RETARDERS

A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

3.03 GENERAL APPLICATION REQUIREMENTS

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.

E. Apply multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

H. Keep insulation materials dry during application and finishing.

I. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

J. Apply insulation with the least number of joints practical.

K. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.

L. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.

1. Apply insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

3. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.

M. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

N. Apply adhesives and mastics at the manufacturer's recommended coverage rate.

O. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.

2. Circumferential Joints: Cover with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches o.c.

3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.

4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.

5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.

P. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.

1. Seal penetrations with vapor-retarder mastic.
2. Apply insulation for exterior applications tightly joined to interior insulation ends.
3. Extend metal jacket of exterior insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal metal jacket to roof flashing with vapor-retarder mastic.

Q. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor-retarder mastic.

R. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.

S. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.

1. Firestopping and fire-resistive joint sealers are specified in Section 07 84 00 "Firestopping."

T. Floor Penetrations: Apply insulation continuously through floor assembly.

1. For insulation with vapor retarders, seal insulation with vapor-retarder mastic where floor supports penetrate vapor retarder.

3.04 MINERAL-FIBER INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet to form a vapor retarder between pipe insulation segments.
3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to flanges as follows:

1. Apply preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch and seal joints with vapor-retarder mastic.

C. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
3. Cover fittings with standard PVC fitting covers.

D. Apply insulation to valves and specialties as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

2. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.

3. Apply insulation to flanges as specified for flange insulation application.

4. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

3.05 plumbing PIPING SYSTEM APPLICATIONS

A. Insulation materials and thicknesses are specified in schedules at the end of this Section.

B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:

1. Flexible connectors.

2. Vibration-control devices.

3. Fire-suppression piping.

4. Below-grade piping, unless otherwise indicated.

5. Air chambers, unions, strainers, check valves, plug valves, and flow regulators.

3.06 FIELD QUALITY CONTROL

A. Insulation applications will be considered defective if sample inspection reveals noncompliance with requirements. Remove defective Work and replace with new materials according to these Specifications.

B. Reinstall insulation and covers on fittings and valves uncovered for inspection according to these Specifications.

3.07 INTERIOR INSULATION APPLICATION SCHEDULE

A. General:

1. Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets.

2. Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

	Service	Material	Thickness	Field Applied Jacket	Vapor Retarder Required	Finish
B.	Domestic cold water, hot and recirculated hot water, and condensate drains Operating Temperature: 60 to 140 deg. F.	Mineral fiber with jacket	Copper Piping ALL sizes: 1/2”	None	Yes	None
C.	Horizontal Rainwater conductors	Mineral fiber or Cellular glass, with jacket	Cast Iron Pipe, ALL sizes: ½”	Foil and paper	Yes	None
D.	Horizontal Rainwater conductors	Mineral fiber or Cellular glass, with jacket	PVC Pipe, ALL sizes: ½”	Foil and paper	Yes	None
E.	Roof drain bodies	Mineral fiber or Cellular glass, with jacket	1”	None	Yes	None
F.	Exposed sanitary drains and domestic water supplies and stops for fixtures for the disabled	“Lav-Guard” as Manufactured by Truebro		PVC P-trap and supply covers	No	White

END OF SECTION

SECTION 22 08 01 - COMMISSIONING OF PLUMBING

PART 1 – GENERAL

1.01 Description

A. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.

B. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the contract documents the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing Contractors/Sub-Contractors.

2. Verify and document proper performance of equipment and systems.

3. Verify that O&M documentation left on site is complete.

4. Verify that the Owner's operating personnel are trained.

C. The commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractors/Sub-Contractors to provide a finished and fully functioning product.

1.02 Related Work

A. Drawings and general requirements of the Contract, including General Conditions and Requirements, Supplementary Conditions, Revisions and other Specification sections, apply to work in this section.

B. Refer to Specification Sections 01 91 00, "Commissioning" and 01 91 03, "Commissioning Process" for information regarding:

1. Responibilities.

2. Commissioning Documentation.

3. Systems to be commissioned.

PART 2 - PRODUCTS

2.01 Test Equipment

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Contractors/Sub-Contractors for the equipment being tested.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, shall be included in the Contractors/Sub-Contractors bid price.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance. All equipment shall be calibrated within the last year, and according to the manufacturer's recommended intervals, and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 – EXECUTION

3.01 Meetings

A. Attend meetings as requied by Sections 01 91 00, "Commissioning" and 01 91 03, "Commissioning Process".

3.02 Reporting

A. Provide installation, start-up, testing, and training reports as required by Sections 01 91 00, "Commissioning" and 01 91 03, "Commissioning Process".

3.03 Documentation, Non-Conformance and Approval of Tests

A. Documentation. Provide all documentation required by Sections 01 91 00, "Commissioning" and 01 91 03, "Commissioning Process".

B. Contractor shall respond to all Non-Conformance reports.

C. Cost of Retesting: The cost for the Contractors/Sub-Contractors to retest a construction and startup or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the CM.

D. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the PM.

END OF SECTION 23 08 01

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pipe and Tube Materials.
2. Fittings.
3. Joining Materials.
4. Polyethylene Encasement.

B. Related Sections:

1. Section 00 43 10 – Break Out Pricing
2. Section 01 21 00 - Allowances
3. Section 01 23 00 - Alternates
4. Section 22 05 00 – Common Work Results for Plumbing
5. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
6. Section 22 05 23 – General Duty Valves for Plumbing Piping
7. Section 22 05 19 - Meters and Gages for Plumbing Piping.
8. Section 22 10 03 - Plumbing Specialties
9. Section 31 20 00 - Earthwork
10. Section 33 00 00 - Utility Services: for exterior water service piping.

C. Only water systems within mechanical rooms are to be metal. All valves within mechanical rooms will be metal. Plastic piping to be bid from mechanical room throughout building.

1.02 DEFINITIONS

A. Water Service Piping: Water piping outside building that conveys water to building (by Site Subcontractor).

B. Service Entrance Piping: Water piping at entry into building between water service piping and water distribution piping (by Plumbing Subcontractor, beginning at 5’-0” outside of building).

C. Water Distribution Piping: Water piping inside building that conveys water to fixtures and equipment throughout the building.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

1. Combined Fire-Protection and Domestic, Service Entrance Piping: 250 psig (provide only where permitted by the authority having jurisdiction).
2. Service Entrance Piping: 160 psig.
3. Water Distribution Piping: 125 psig.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: Water Samples, Test Results, and Reports: Specified in "Field Quality Control" and "Cleaning" articles.

1.05 QUALITY ASSURANCE

A. Provide listing/approval stamp, label, or other marking on piping made to specified standards.

B. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

C. Comply with NSF 61, "Drinking Water System Components--Health Effects," Sections 1 through 9 for potable-water piping and components.

PART 2 PRODUCTS

2.01 PIPE AND TUBE MATERIALS

A. General: Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Article.

B. Soft Copper Tube: ASTM B88, Types K and L, water tube, annealed temper.

C. Hard Copper Tube: ASTM B88, Types L, water tube, drawn temper.

D. Ductile-Iron Pipe: AWWA C151, 250-psig minimum pressure rating with mechanical- or push-on-joint bell, plain spigot end, and AWWA C104 cement-mortar lining. Include AWWA C111 ductile-iron gland, rubber gasket, and steel bolts with mechanical-joint pipe. Include AWWA C111 rubber gasket with push-on-joint pipe.

E. Flanged, Ductile-Iron Pipe: AWWA C115 ductile-iron barrel with 250-psig pressure rating and AWWA C104 cement-mortar lining. Include Class 150 or 300, iron-alloy threaded flanges that match piping.

F. CPVC PIPING

1. CPVC Schedule [40] [80] Pipe: ASTM F441/F 441M.

a. CPVC Schedule 40 Fittings: ASTM F438, socket type.

b. CPVC Schedule 80 Fittings: [ASTM F439, socket] [ASTM F437, threaded] [ASTM F439, socket type or ASTM F437, threaded] type.

2.02 PIPE AND TUBE FITTINGS

A. General: Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Article.

B. Copper, Solder-Joint Pressure Fittings: ASME B16.18 cast-copper alloy or ASME B16.22 wrought copper.

C. Copper, Grooved-End Fittings: ASTM B75 copper tube or ASTM B584 bronze castings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

E. Copper Unions: ASME B16.18, cast-copper-alloy, hexagonal-stock body with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends. Include threads conforming to ASME B1.20.1 on threaded ends.

F. Ductile-Iron, Mechanical- or Push-on-Joint Fittings: AWWA C110, ductile- or gray-iron standard pattern; or AWWA C153, ductile-iron compact pattern; with 250-psig minimum pressure rating and AWWA C104 cement-mortar lining. Include AWWA C111 ductile- or gray-iron glands, rubber gaskets, and steel bolts with mechanical-joint fittings. Include AWWA C111 rubber gaskets with push-on-joint fittings.

G. Ductile-Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical-joint ends conforming to AWWA C110 or AWWA C153. Include 2 gasketed ball-joint sections, 1 or more gasketed sleeve sections, 250-psig minimum working-pressure rating, and AWWA C550 epoxy interior coating. Assemble components for offset and expansion indicated. Include AWWA C111 ductile-iron glands, rubber gaskets, and steel bolts.

H. Ductile-Iron, Grooved-End Fittings: ASTM A47 malleable-iron castings or ASTM A536 ductile-iron castings with cement-mortar lining or AWWA C550 interior coating and dimensions matching ductile-iron pipe.

I. Ductile-Iron Flanged Fittings: AWWA C110, ductile- or gray-iron standard pattern; with 250-psig minimum pressure rating and AWWA C104 cement-mortar lining.

J. Ferrous Expansion Joints: Compound, galvanized steel fitting with telescoping body and slip-pipe section. Include 150-psig minimum pressure rating, packing rings, packing, limit rods, chrome-plated finish on slip-pipe section, flanged ends, and AWWA C550 epoxy interior coating.

K. Ferrous, Double Expansion Joints: Compound, galvanized steel fitting with telescoping body and 2 slip-pipe sections. Include 150-psig minimum pressure rating, packing rings, packing, limit rods, chrome-plated finish on slip-pipe sections, flanged ends, and AWWA C550 epoxy interior coating.

2.03 JOINING MATERIALS

A. General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.

B. Refer to Section 22 05 00 - "Common Work Results for Plumbing" for commonly used joining materials.

C. Solder: ASTM B32, Alloy Sn95, Sn94, or E; lead free.

D. Brazing Filler Metal: AWS A5.8, BCuP, copper phosphorus or BAg, silver classification.

E. Copper, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

F. Ductile-Iron, Keyed Couplings: AWWA C606 for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

G. Transition Couplings: Coupling or other manufactured fitting same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

PART 3 EXECUTION

3.01 EXCAVATION

A. Refer to Section 31 20 00 - "Earth Moving" for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Fitting Option: Mechanically formed tee-branch outlets and brazed joints may be used on aboveground copper tubing.

D. Underground, Service Entrance Piping: Do not use flanges or valves underground. Use the following:

1. 2-Inch NPS (DN50) and Smaller: Soft copper tube, Type K (Type A); copper, solder-joint pressure fittings; and soldered joints.

2. 2-1/2- to 3-1/2-Inch NPS (DN65 to DN90): Soft copper tube, Type K (Type A); copper, solder-joint pressure fittings; and soldered joints.

3. 4- to 8-Inch NPS (DN100 to DN200): Ductile-iron pipe and fittings, and mechanical or push-on joints.

E. Aboveground, Water Distribution Piping: Use the following:

1. 3-1/2-Inch NPS (DN90) and Smaller: Hard copper tube, Type L (Type B); copper, solder-joint fittings; and soldered joints.

2. 4- to 6-Inch NPS (DN100 to DN150): Hard copper tube, Type L (Type B) with grooved ends; copper, grooved-end fittings; and copper, keyed couplings.

F. Underground, Water Distribution Piping: Do not use flanges or valves underground. Use the following:

1. 2-Inch NPS (DN50) and Smaller: Soft copper tube, Type L (Type B); wrought-copper, solder-joint pressure fittings; and soldered joints.

2. 2-1/2- to 4-Inch NPS (DN65 to DN100): Hard copper tube, Type L (Type B); wrought-copper, solder-joint pressure fittings; and soldered joints.

G. Non-Potable-Water Piping: Use the following:

1. 3-1/2-Inch NPS (DN90) and Smaller: Hard copper tube, Type L (Type B); solder-joint pressure fittings; and soldered joints - or - PVC ASTM D1785, schedule 40.

3.03 PIPING INSTALLATION, GENERAL

A. Refer to Section 22 05 00 - "Common Work Results for Plumbing" for basic piping installation.

3.04 SERVICE ENTRANCE PIPING INSTALLATION

A. Extend service entrance piping to exterior water service piping in sizes and locations indicated for service entrances into building. Refer to Section 33 00 00 - "Utilities" for water service piping.

B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each service entrance pipe per local Utility Code requirements.

C. Ductile-Iron, Service Entrance Piping: Comply with AWWA C600. Install buried piping between shutoff valve and connection to water service piping with restrained joints. Anchor pipe to wall or floor at entrance. Include thrust-block supports at vertical and horizontal offsets.

1. Encase piping with polyethylene film according to ASTM A674 or AWWA C105 if required by the local authority having jurisdiction.

D. Install wall penetration system at each service entrance pipe penetration through foundation wall. Make installation watertight. Refer to Section 22 05 00 - "Common Work Results for Plumbing" for wall penetration systems.

3.05 WATER DISTRIBUTION PIPING INSTALLATION

A. Install piping with 0.25 percent slope downward toward drain.

3.06 JOINT CONSTRUCTION

A. Refer to Section 22 05 00 - "Common Work Results for Plumbing" for basic piping joint construction.

B. Grooved Joints: Assemble joints with coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

3.07 HANGER AND SUPPORT INSTALLATION

A. Refer to Section 22 05 29 - "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices. Install the following:

1. Riser clamps, MSS Type 8 or Type 42, for vertical runs.
2. Adjustable steel clevis hangers, MSS Type 1, for individual, straight, horizontal runs 100 feet and less.
3. Adjustable roller hangers, MSS Type 43, for individual, straight, horizontal runs longer than 100 feet.
4. Spring cushion rolls, MSS Type 49, if indicated, for individual, straight, horizontal runs longer than 100 feet.
5. Pipe rolls, MSS Type 44, for multiple, straight, horizontal runs 100 feet or longer. Support pipe rolls on trapeze.
6. Spring hangers, MSS Type 52, for supporting base of vertical runs.

B. Install supports according to Section 22 05 29 - "Hangers and Supports for Plumbing Piping and Equipment"

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for copper tubing with the following maximum spacing and minimum rod diameters:

1. 3/4-Inch NPS (DN20) and Smaller: Maximum horizontal spacing, 60 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
2. 1-Inch NPS (DN25): Maximum horizontal spacing, 72 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
3. 1-1/4-Inch NPS (DN32): Maximum horizontal spacing, 72 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
4. 1-1/2 and 2-Inch NPS (DN40 and DN50): Maximum horizontal spacing, 96 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
5. 2-1/2-Inch NPS (DN65): Maximum horizontal spacing, 108 inches with 1/2-inch minimum rod diameter; maximum vertical spacing, 10 feet.
6. 3-Inch NPS (DN80): Maximum horizontal spacing, 10 feet with 1/2-inch minimum rod diameter; maximum vertical spacing, 10 feet.
7. 3-1/2-Inch NPS (DN90): Maximum horizontal spacing, 10 feet with 1/2-inch minimum rod diameter; maximum vertical spacing, 10 feet.
8. 4- and 5-Inch NPS (DN100 and DN125): Maximum horizontal spacing, 10 feet with 1/2-inch minimum rod diameter; maximum vertical spacing, 10 feet.

F. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.08 CONNECTIONS

A. Connect service entrance piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

B. Connect water distribution piping to service entrance piping at shutoff valve, and extend to and connect to the following:

1. Water Heaters: Connect cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

2. Plumbing Fixtures: Connect hot- and cold-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Section 22 40 00 - "Plumbing Fixtures."

3. Equipment: Connect hot- and cold-water supply piping as indicated. Provide shutoff valve and union for each connection. Use flanges instead of unions for connections 2-1/2-inch NPS (DN65) and larger.

4. Booster Systems (Where required): Connect cold-water suction and discharge piping.

3.09 FIELD QUALITY CONTROL

A. Inspect service entrance piping and water distribution piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

a. Roughing-In Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test service entrance piping and water distribution piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.

3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.

4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

5. Prepare reports for tests and required corrective action.

3.10 CLEANING

A. Clean and disinfect service entrance piping and water distribution piping as follows:

1. Purge new piping and parts of existing water piping that have been altered, extended, or repaired before using.

2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, procedure described in either AWWA C651 or AWWA C652 or as described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.

2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for 3 hours.

c. Flush system with clean, potable water until chlorine is no longer in water coming from system after the standing time.

d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows contamination.

B. Prepare and submit reports for purging and disinfecting activities.

C. Clean interior of piping system. Remove dirt and debris as work progresses.

3.11 COMMISSIONING

A. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

B. Perform the following steps before putting into operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.

3. Open throttling valves to proper setting.

4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.

5. Remove and clean strainer screens. Close drain valves and replace drain plugs.

6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.

C. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

D. Check plumbing specialties and verify proper settings, adjustments, and operation.

1. Water-Pressure Regulators: Set outlet pressure at 80 psig maximum, unless otherwise indicated.

E. Energize pumps and verify proper operation.

END OF SECTION

SECTION 22 11 23.13

DOMESTIC WATER PACKAGED BOOSTER PUMPS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Packaged Domestic Water Booster Pumps

B. Related Sections:

1. Section 03 30 00 - Cast-in-Place Concrete: for concrete bases.
2. Section 21 10 00 - Fire Suppression Systems: for fire-suppression pumps.
3. Section 22 05 00 - Common Work Results for Plumbing
4. Section 22 05 13 - Common Motor Requirements for Plumbing Equipment: for general motor requirements.
5. Section 22 05 23 - General Duty Valves for Plumbing Piping
6. Section 22 11 16 - Domestic Water Piping
7. Section 22 11 23 - Domestic Water Pumps

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. Include certified performance curves and rated capacities of selected models, furnished specialties, and accessories for each type and size of packaged booster pump indicated.

b. Maintenance Data: For each packaged booster pump to include in maintenance manuals specified in Division 01.

B. Shop Drawings: Show layout and connections for packaged booster pumps. Include setting drawings with templates, directions for installation of foundation and anchor bolts, and other anchorages.

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain same type of packaged booster pumps through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's rigging instructions for handling.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Packaged Domestic Water Booster Pumps:

a. Aurora Pump (630-859-7000)

b. Peerless Pump Co. (800-879-0182)

c. SynchroFlo, Inc. (770-447-4443)

d. ITT Fluid Technology Corp.; ITT Bell & Gossett Div. (800-908-8932)

2.02 PACKAGED DOMESTIC WATER BOOSTER PUMPS

A. Description: Factory-assembled and tested, packaged booster pump units; complying with UL 778; suitable for potable-water service. Multiplex packaged unit, with pumps, piping, valves, sensors, hydro-pneumatic tank, and controls for constant speed operation.

1. Minimum Pressure Rating: 175 psig.

2. Pump Arrangement: Duplex, with two equal-size pumps.

3. Pumps: Comply with HI 1.1-1.5, "Centrifugal Pumps," for close-coupled, end-suction centrifugal pumps.

a. Construction: Single stage, radially split, bronze fitted.

b. Impeller: ASTM B584, cast bronze; statically and dynamically balanced, closed, overhung, single suction, and keyed to shaft.

4. Pumps: Comply with HI 2.1-2.5, "Vertical Pumps," for multistage barrel pumps.

a. Construction: Multistage, bronze fitted.

b. Impellers: ASTM B584, cast bronze; statically and dynamically balanced, closed or semiopen, and keyed to shaft.

5. Control Valve: Adjustable, automatic, direct-acting, pressure regulator for each pump discharge.

B. Motors: Comply with requirements in Section 22 05 13 "Common Motor Requirements for Plumbing Equipment."

C. Piping: ASME B31.9 for piping materials and installation.

1. NPS 4 (DN100) and Smaller: ASTM B88, Type L, drawn, copper, water tube with copper, solder-joint, pressure fittings and brazed joints.

2. Header End Connections NPS 2 (DN50) and Smaller: Threaded.

3. Header End Connections NPS 2-1/2 (DN65) and Larger: Flanged.

D. Piping Option: Piping, including valves and other components, may have grooved ends for grooved joints.

E. Shutoff Valves, NPS 2 (DN50) and Smaller: MSS SP-110, 600-psig minimum CWP, bronze ball valve with ends matching piping.

F. Shutoff Valves, NPS 2-1/2 (DN65) and Larger: MSS SP-70, Class 125, bronze-trim, OS&Y, cast-iron gate valve with flanged ends or MSS SP-67, Type I for tight shutoff, 175-psig CWP, single-flanged, cast-iron butterfly valve.

G. Check Valves, NPS 2 (DN50) and Smaller: MSS SP-80, Class 125, bronze, swing check valve.

H. Check Valves, NPS 2-1/2 (DN65) and Larger: MSS SP-71, Class 125, bronze-trim, cast-iron, swing check valve.

I. Dielectric Fittings: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and to stop corrosion.

1. NPS 2 (DN50) and Smaller: Factory-fabricated union assembly, for 250-psig minimum working pressure at 180 deg F.

2. NPS 2-1/2 (DN65) and Larger: Factory-fabricated, companion-flange assembly; for 150- or 300-psig minimum working pressure as required to suit system pressures.

J. Sensors: Pressure switches.

K. Control Panel: Automatic, with load control and protection functions. Comply with NEMA ICS 2 and UL 508.

1. Mounting and Wiring: Factory installed and connected as an integral part of unit.

2. Enclosure: NEMA ICS 6, Type 12.

3. Motor Controller: Full-voltage, combination-magnetic type with undervoltage release feature, motor-circuit-protector-type disconnect, and short-circuit protective device.

a. Control Voltage: 120-V ac, using integral control power transformer, primary and secondary fuses.

4. Motor Overload Protection: Overload relay in each phase.

5. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.

6. Duplex, Automatic Alternating Starter: Switches lead pump to lag main pump and to two-pump operation.

7. Instrumentation: Unit suction and discharge pressure gages.

8. Alarm Signal Device: Sounds audible alarm when backup pumps are operating, alarm light, manual reset.

9. Instrumentation Panel: Unit suction and discharge pressure gages, failure logic and indicating light, auto reset after alarm condition clears.

L. Finish: Manufacturer's standard paint applied to factory-assembled and tested units before shipping.

M. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembling and testing. Protect flanges, pipe openings, and nozzles.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of water distribution piping to verify actual locations of connections before packaged booster pump installation.

3.02 INSTALLATION

A. Install packaged booster pumps according to manufacturer's written instructions and with access for periodic maintenance, including removing motors, impellers, couplings, and accessories.

1. Install units with total of 7.5 hp or less, with rubber-isolator mount or spring-isolator vibration isolators.

2. Install units with total of more than 7.5 hp, with concrete-filled, inertia-base vibration isolation bases and spring-isolator vibration isolators.

B. Support connected piping so weight of water distribution piping is not supported by packaged booster pumps.

3.03 CONNECTIONS

A. Piping installation requirements are specified in Section 22 11 16 - "Domestic Water Piping." Drawings indicate general arrangement of piping and specialties. The following are specific connection requirements:

1. Connect water distribution piping to pumps. Install suction and discharge pipe equal to or greater than size of unit suction and discharge headers.

2. Install flexible pipe connectors on piping connections to unit suction and discharge headers. Install flexible pipe connectors same size as piping. Refer to Section 23 05 00 - "Common Work Results for Plumbing " for flexible pipe connectors.

3. Install shutoff valves on piping connections to unit suction and discharge headers. Install valves same size as unit suction and discharge headers. Refer to Section 22 05 23 - "General Duty Valves for Plumbing Piping" for general-duty valves.

B. Install electrical connections for power, controls, and devices.

C. Electrical wiring and connections are specified in Division 26 Sections.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 COMMISSIONING

A. Check suction piping connections for tightness.

B. Controls: Set for automatic starting, stopping, sequential, and alarm operations.

C. Final Checks before Starting: Perform the following preventive maintenance operations:

1. Lubricate bearings.

2. Verify that each pump is free to rotate by hand and that pump for handling hot liquids is free to rotate with pump hot and cold. Do not operate pump if it is bound or drags, until cause of trouble is determined and corrected.

3. Verify that pump controls are correct for required application.

D. Starting procedure for pumps is as follows:

1. Prime pumps by opening suction valves and closing drains, and prepare pumps for operation.

2. Open valves if pumps should not be operated against dead shutoff.

3. Start motors.

4. Open discharge valves slowly.

5. Check general mechanical operation of pumps and motors.

6. Close valves once there is sufficient flow through pumps to prevent overheating.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units as specified below:

1. Conduct training as specified in Division 01.
2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining units.

END OF SECTION 22 11 23.13

SECTION 22 11 23 - DOMESTIC WATER PUMPS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Domestic Water Inline Pumps
2. Section 22 05 23 - General Duty Valves for Plumbing Piping
3. Section 22 05 19 - Meters and Gages for Plumbing Piping
4. Section 22 11 16 - "Domestic Water Piping
5. Section 22 34 00 – Fuel-Fired Domestic Water Heaters.
6. Division 26 Sections for power-supply wiring, field-installed disconnects, electrical devices, and motor controllers.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating items selected for use in Project with the following supporting data:

1. Product Data:

a. Include certified performance curves and rated capacities of selected models; shipping, installed, and operating weights; furnished specialties; and accessories for each type and size of pump specified. Indicate pumps' operating point on curves.

2. Maintenance Data: For each pump specified to include in maintenance manuals specified in Division 01.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain same type of pumps through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Domestic Water Inline Pumps:

a. Armstrong Pumps, Inc. (716-693-8813)

b. ITT Industires (201-760-9800)

c. Taco, Inc. (401-942-2360)

2.02 GENERAL

A. Description: Factory-assembled and -tested, single-stage, centrifugal pump units; complying with UL 778; suitable for potable-water service; with all-bronze or stainless-steel construction and components in contact with water made of corrosion-resistant materials.

B. Motors: Comply with requirements in Section 22 05 13 "Common Motor Requirements for Plumbing Equipment" with built-in thermal-overload protection appropriate for motor size and duty.

C. End Connections for NPS 2 (DN50) and Smaller: Threaded. Pumps available only with flanged ends may be furnished with threaded companion flanges.

D. End Connections for NPS 2-1/2 (DN65) and Larger: Flanged.

E. Finish: Manufacturer's standard paint applied to factory-assembled and -tested units before shipping.

F. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles.

2.03 DOMESTIC WATER IN-LINE PUMPS

A. Description: Horizontal in-line circulator, rated for 125-psig minimum working pressure and minimum continuous water temperature of 225 deg F.

1. Construction: Radially split, all-bronze casing.

2. Impeller: ASTM B36, rolled brass; or ASTM B584, cast bronze; overhung, single suction, and keyed to shaft.

3. Seal: Mechanical.

4. Shaft and Sleeve: Steel shaft, with oil-lubricated copper sleeve.

5. Pump Bearings: Oil-lubricated, bronze-journal or thrust type.

6. Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.

7. Motor: Single speed, with oil-lubricated bearings, unless otherwise indicated; and resiliently mounted to pump casing.

a. Motor Size: For motors larger than 1/2 hp, select motor size that will not overload through full range of pump performance curve.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of water distribution piping to verify actual locations of connections before pump installation.

3.02 INSTALLATION

A. Install pumps according to manufacturer's written instructions and with access for periodic maintenance, including removing motors, impellers, couplings, and accessories.

B. Support pumps and piping so weight of each is not supported by the other.

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties. The following are specific connection requirements:

1. Connect water distribution piping to pumps. Install suction and discharge pipe equal to or greater than size of pump nozzles. Refer to Section 22 11 16 - "Domestic Water Piping."

2. Install shutoff valve and strainer on suction side of pumps, and check valve and throttling valve on discharge side of pumps. Install valves same size as connected piping. Refer to Section 22 05 23 - "General Duty Valves for Plumbing Piping" for general-duty valves.

3. Install pressure gages at suction and discharge of pumps. Install at integral pressure-gage tappings where provided or install pressure-gage connectors in suction and discharge piping around pumps. Refer to Section 22 05 19 - "Meters and Gages for Plumbing Piping" for pressure gages and gage connectors.

B. Electrical wiring and connections are specified in Division 26 Sections.

C. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 COMMISSIONING

A. Check suction piping connections for tightness.

B. Final Checks before Starting: Perform the following preventive maintenance operations:

1. Lubricate oil-lubricated-type bearings.

2. Verify that pump is free to rotate by hand and that pump for handling hot liquids is free to rotate with pump hot and cold. Do not operate pump if it is bound or drags, until cause of trouble is determined and corrected.

3. Verify that pump controls are correct for required application.

C. Starting procedure for pumps is as follows:

1. Prime pump by opening suction valves and closing drains, and prepare pump for operation.

2. Open circulating line valve if pump should not be operated against dead shutoff.

3. Open discharge valve slowly.

4. Check general mechanical operation of pump and motor.

5. Close circulating line valve once there is sufficient flow through pump to prevent overheating.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain pumps as specified below:

1. Conduct training as specified in Division 01 Sections.

2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining pumps.

END OF SECTION

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pipe Materials.
2. Fittings.
3. Joining Materials.

B. Related Sections:

1. Section 07 84 00 - Firestopping: for fire-barrier sealers.
2. Section 08 31 00 - Access Doors: for access panels to concealed components.
3. Section 09 90 00 - Painting: for field-applied finishes for piping.
4. Section 00 43 10 – Break Out Pricing
5. Section 01 21 00 - Allowances
6. Section 01 23 00 - Alternates
7. Section 11 31 00 - Residential Appliances: for drainage and vent services for clothes washers.
8. Section 11 40 00 - Food Service Equipment: for drainage and vent services for food service equipment.
9. Section 22 05 00 – Common Work Results for Plumbing
10. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
11. Section 22 05 53 – Identification for Plumbing Piping and Equipment.
12. Section 22 07 00 - Plumbing Insulation.
13. Section 22 30 00 - Plumbing Equipment.
14. Section 22 40 00 - Plumbing Fixtures.
15. Section 31 20 00 – Earth Moving: for excavating, trenching, and backfilling.
16. Section 33 00 00 – Utilities

C. All drain piping to be plastic thoughout building unless required otherwise by local codes.

1.02 DEFINITIONS

A. Sewerage Piping: Building sewer piping outside building that conveys sanitary sewage from building (by Site Contractor).

B. Drainage Piping: Building sewer piping outside building that conveys storm drainage from building (by Plumbing Contractor, beginning at 5’-0” outside of building.)

C. Service Entrance Piping: Drainage piping at entry into building between outside building sewer piping and inside drainage piping (by Site Contractor).

D. Drainage and Vent Piping: Piping inside building that conveys waste water and vapors from fixtures and equipment throughout the building.

E. The following are industry abbreviations for plastic and other piping materials:

1. PVC: Polyvinyl chloride.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

1. Soil, Waste, and Vent Systems: 10-foot head of water.

2. Storm Drainage Systems: 10-foot head of water.

3. Sewage, Force-Main Piping Systems: 100 psig (only where required due to local conditions).

1.04 SUBMITTALS

A. Product Data:

1. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in project.

B. Test Results and Reports: Specified in "Field Quality Control" Article.

1.05 QUALITY ASSURANCE

A. Provide listing/approval stamp, label, or other marking on piping made to specified standards.

B. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. General: Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Article.

B. Hub-and-Spigot, Cast-Iron Soil Pipe: ASTM A74, Service weight ASTM C564 rubber gasket.

C. Hubless, Cast-Iron Soil Pipe: ASTM A888 or CISPI 301.

D. PVC Plastic Pipe: ASTM D2665, Schedule 40.

E. Steel Pipe: ASTM A53.

F. Ductile Iron Pipe: AWWA C151.

G. Copper Tubing: ASTM B306.

H. PVC Piping

1. PVC Pipe: ASTM D2665, solid-wall drain, waste, and vent.

a. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns.

2. Cellular-Core, Schedule 40, PVC Pipe: ASTM F891, Schedule 40.

a. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

3. Cellular-Core, Sewer and Drain Series, PVC Pipe: ASTM F891, Series PS 100.

a. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns and to fit Series PS 100 sewer and drain pipe.

2.02 JOINING MATERIALS

A. General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.

B. Refer to Section 22 95 00 - "Common Work Results for Plumbing" for commonly used joining materials.

C. Hubless, Cast-Iron, Soil-Piping Couplings: ASTM C1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C564 rubber sleeve or gasket with integral, center pipe stop. Include the following:

1. Heavy-Duty, Stainless-Steel couplings: ASTM A666, Type 304, stainless-steel housing or shield; and stainless-steel clamps. Include gasket.

a. Clamp Width: 3 inches wide with 4 clamps, for piping 1-1/2- to 4-inch NPS.

b. Clamp Width: 4 inches wide with 6 clamps, for piping 5- to 10-inch NPS.

2. Heavy-Duty, FM-Approved, Stainless-Steel Couplings: ASTM A666, Type 304, stainless-steel housing; and stainless-steel clamps. Include gasket or bushing.

a. Clamp Width: 3 inches wide with 2 clamps, for piping 1-1/2- to 4-inch NPS.

b. Clamp Width: 4 inches wide with 2 clamps, for piping 5- to 10-inch NPS.

3. Heavy-Duty, Cast-Iron Couplings: ASTM A48, 2-piece, cast-iron housing; and stainless-steel bolts and nuts. Include gasket.

D. Transition Couplings: Coupling or other manufactured fitting same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

E. Flexible, Transition Couplings for Underground, Nonpressure Piping: ASTM C1173 with elastomeric sleeve. Include ends same sizes as piping to be joined and include corrosion-resistant metal band on each end.

1. Sleeve Type for Plain-End Piping: Rubber or elastomeric sleeve and stainless-steel band assembly, fabricated to match outside diameters of piping to be joined. Include the following:

a. Sleeves for Cast-Iron Soil Piping: ASTM C564 rubber.

b. Sleeves for Plastic Piping: ASTM F477 elastomeric seal.

c. Sleeves for Dissimilar Piping: Compatible with piping materials to be joined.

d. Bands: Stainless steel, one at each pipe insert.

2. Gasket Type for Dissimilar-End Piping: Rubber or elastomeric compression gasket, made to match inside diameter of pipe or hub, and outside diameter of adjoining pipe. Include the following:

a. Gaskets for Cast-Iron Soil Piping: ASTM C564 rubber.

b. Gaskets for Plastic Piping: ASTM F477 elastomeric seal.

c. Gaskets for Dissimilar Piping: Compatible with piping materials to be joined.

2.03 PIPE AND TUBE FITTINGS

A. General: Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Article.

B. Hub-and-Spigot, Cast-Iron, Soil-Pipe Fittings: ASTM A74, Service weighthub and spigot. Include ASTM C564 rubber gasket for each hub.

C. Hubless, Cast-Iron, Soil-Pipe Fittings: CISPI 301.

D. Ferrous Expansion Joints: Compound, galvanized steel fitting with telescoping body and slip-pipe section. Include packing rings, packing, limit rods, chrome-plated finish on slip-pipe section, and flanged ends.

E. Ferrous, Double Expansion Joints: Compound, galvanized steel fitting with telescoping body and 2 slip-pipe sections. Include packing rings, packing, limit rods, chrome-plated finish on slip-pipe sections, and flanged ends.

F. PVC Socket Fittings: ASTM D2665, made to ASTM D3311 drain, waste, and vent pipe patterns.

G. PVC Plastic, Tubular Fittings: ASTM F409 drainage pattern, with ends as required for application.

H. Steel Pipe Fittings:

1. Cast-Iron, Threaded, Drainage Fittings: ASME B16.12 [galvanized].

2. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, [galvanized,] standard pattern.

3. Cast-Iron Flanges: ASME B16.1, Class 125.

4. Cast-Iron, Flanged Fittings: ASME B 16.1, Class 125 [galvanized].

I. Ductile Iron Pipe Fittings:

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Glands, Gaskets, and Bolts: AWWA C111, ductile or gray-iron glands, rubber gaskets, and steel bolts.

J. Copper Tube Fittings:

1. ASME B16.23, cast copper or ASME B16.29 wrought copper, solder-joint fittings.

PART 3 EXECUTION

3.01 EXCAVATION

A. Refer to Section 31 20 00 - "Earth Moving" for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Aboveground, Soil, Waste, and Vent Piping: Use the following:

1. 1-1/2-Inch NPS: Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

2. 2- to 4-Inch NPS: Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

3. 2- to 4-Inch NPS: Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

4. 5- and 6-Inch NPS (DN125 and DN150): Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

5. 5- and 6-Inch NPS (DN125 and DN150): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

D. Underground, Soil, Waste, and Vent Piping: Use the following:

1. 1-1/2-Inch NPS: Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

2. 2- to 4-Inch NPS: Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

3. 2- to 4-Inch NPS: Hub-and-spigot, cast-iron soil pipe, Extra Heavy class; hub-and-spigot, cast-iron, soil-pipe fittings, Extra Heavy class; and compression joints.

4. 2- to 4-Inch NPS: Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

d. Couplings: Compact, Type 304, stainless steel.

5. 2- to 4-Inch NPS (DN50 to DN100): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.

6. 5- and 6-Inch NPS (DN125 and DN150): Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

7. 5- and 6-Inch NPS (DN125 and DN150): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

d. Couplings: Compact, Type 304, stainless steel.

8. 5- and 6-Inch NPS (DN125 and DN150): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.

9. 8-Inch NPS (DN200): Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

10. 8-Inch NPS (DN200): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

d. Couplings: Compact, Type 304, stainless steel.

11. 8-Inch NPS (DN200): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.

E. Aboveground, Storm Drainage Piping: Use the following:

1. 2- to 4-Inch NPS (DN50 to DN100): Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

2. 2- to 4-Inch NPS (DN50 to DN100): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

d. Couplings: Heavy-duty, Type 301, stainless steel.

3. 2- to 4-Inch NPS (DN50 to DN100): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.

4. 5- and 6-Inch NPS (DN125 and DN150): Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

5. 5- and 6-Inch NPS (DN125 and DN150): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

d. Couplings: Heavy-duty, Type 301, stainless steel.

6. 5- and 6-Inch NPS (DN125 and DN150): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.

F. Underground, Storm Drainage Piping: Use the following:

1. 3- and 4-Inch NPS (DN80 and DN100): Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

2. 3- and 4-Inch NPS (DN80 and DN100): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

d. Couplings: Compact, Type 304, stainless steel.

3. 3- and 4-Inch NPS (DN80 and DN100): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.

4. 5- and 6-Inch NPS (DN125 and DN150): Hub-and-spigot, cast-iron soil pipe, Service class; hub-and-spigot, cast-iron, soil-pipe fittings, Service class; and compression joints.

5. 5- and 6-Inch NPS (DN125 and DN150): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

d. Couplings: Compact, Type 304, stainless steel.

6. 5- and 6-Inch NPS (DN125 and DN150): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.

7. 8-Inch NPS (DN200): Hub-and-spigot, cast-iron soil pipe, Extra Heavy class; hub-and-spigot, cast-iron, soil-pipe fittings, Extra Heavy class; and compression joints.

8. 8-Inch NPS (DN200): Hubless, cast-iron soil pipe; hubless, cast-iron, soil-pipe fittings; and one of the following hubless, cast-iron, soil-piping couplings:

a. Couplings: Heavy-duty, Type 304, stainless steel.

b. Couplings: Heavy-duty, FM-approved, Type 304, stainless steel.

c. Couplings: Heavy-duty, cast iron.

d. Couplings: Compact, Type 304, stainless steel.

9. 8-Inch NPS (DN200): PVC plastic pipe, PVC socket fittings, and solvent-cemented joints.

10. 5- and 6-Inch NPS (DN125 and DN150): Hard copper water tube, Type L (Type B); copper, grooved-end fittings; and copper, keyed couplings.

11. 5- and 6-Inch NPS (DN125 and DN150): Ductile-iron, grooved-end pipe; ductile-iron, grooved-end fittings; and ductile-iron, keyed couplings.

3.03 PIPING INSTALLATION, GENERAL

A. Refer to Section 22 95 00 - "Common Work Results for Plumbing" for basic piping installation.

3.04 SERVICE ENTRANCE PIPING INSTALLATION

A. Refer to Section 33 00 00 - "Utilities" for sanitary piping.

B. Extend building sanitary drain piping and connect to sanitary sewer piping in sizes and locations indicated for service entrances into building. Install cleanout and extension to grade at connections of building sanitary drains with building sanitary sewers.

C. Extend building storm drain piping and connect to storm sewer piping in sizes and locations indicated for service entrances into building. Install cleanout and extension to grade at connections of building storm drains and building storm sewers.

D. Extend building storm drain, force-main piping and connect to storm sewer piping in size and location indicated for service entrance into building. Install cleanout, fitting with closure plug or equivalent, inside building.

E. Install wall penetration system at each service entrance pipe penetration through foundation wall. Make installation watertight. Refer to Section 22 95 00 - "Common Work Results for Plumbing" for wall penetration systems.

3.05 DRAINAGE AND VENT PIPING INSTALLATION

A. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

B. Make changes in direction for drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not make change in direction of flow greater than 90 degrees. Use proper size of standard increasers and reducers if different sizes of piping are connected. Reducing size of drainage piping in direction of flow is prohibited.

C. Lay buried building drain piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

D. Install drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Sanitary Building Drain: 2 percent downward in direction of flow for piping 2-inch NPS (DN80) and smaller; 1 percent downward in direction of flow for piping 3-inch NPS (DN100) and larger. Grease sanitary piping shall be provided with 2 percent slope in direction of flow.
2. Storm Building Drain: 1 percent downward in direction of flow.
3. Horizontal, Storm Drainage Piping: 2 percent downward in direction of flow.
4. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

E. Install engineered, sanitary drainage and vent systems in locations indicated and as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
2. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

F. Install engineered, controlled-flow, storm drainage systems in locations indicated. Comply with standards of authorities having jurisdiction.

G. Sleeves are not required for cast-iron soil piping passing through concrete slab on grade if slab is without membrane waterproofing.

H. Install PVC plastic drainage piping according to ASTM D2665.

I. Install underground, PVC plastic drainage piping according to ASTM D2321.

3.06 JOINT CONSTRUCTION

A. Refer to Section 22 95 00 - "Common Work Results for Plumbing" for basic piping joint construction.

B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Compression Joints: Make with rubber gasket matching class of pipe and fittings.
2. Hubless Joints: Make with rubber gasket and sleeve or clamp.

C. Grooved Joints: Assemble joints with coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

D. PVC Piping Joints: Join drainage piping according to ASTM D2665.

E. Handling of Solvent Cements, Primers, and Cleaners: Comply with procedures in ASTM F402 for safe handling during joining of plastic pipe and fittings.

3.07 HANGER AND SUPPORT INSTALLATION

A. Refer to Section 22 05 29 - "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices. Install the following:

1. Riser clamps, MSS Type 8 or Type 42, for vertical runs.
2. Adjustable steel clevis hangers, MSS Type 1, for individual, straight, horizontal runs 100 feet and less.
3. Adjustable roller hangers, MSS Type 43, for individual, straight, horizontal runs longer than 100 feet.
4. Spring cushion rolls, MSS Type 49, if indicated, for individual, straight, horizontal runs longer than 100 feet.
5. Pipe rolls, MSS Type 44, for multiple, straight, horizontal runs 100 feet or longer. Support pipe rolls on trapeze.
6. Spring hangers, MSS Type 52, for supporting base of vertical runs.

B. Install supports according to 22 05 29 - "Hangers and Supports for Plumbing Piping and Equipment"

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum spacing and minimum rod diameters:

1. 1-1/2- and 2-Inch NPS (DN40 and DN50): Maximum horizontal spacing, 60 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 15 feet.
2. 3-Inch NPS (DN80): Maximum horizontal spacing, 60 inches with 1/2-inch minimum rod diameter; maximum vertical spacing, 15 feet.
3. 4- and 5-Inch NPS (DN100 and DN125): Maximum horizontal spacing, 60 inches with 5/8-inch minimum rod diameter; maximum vertical spacing, 15 feet.
4. 6-Inch NPS (DN150): Maximum horizontal spacing, 60 inches with 3/4-inch minimum rod diameter; maximum vertical spacing, 15 feet.
5. 8- through 12-Inch NPS (DN200 through DN300): Maximum horizontal spacing, 60 inches with 7/8-inch minimum rod diameter; maximum vertical spacing, 15 feet.
6. Spacing for horizontal pipe in 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Install hangers for PVC plastic piping with the following maximum spacing and minimum rod diameters:

1. 1-1/2- and 2-Inch NPS (DN40 and DN50): Maximum horizontal spacing, 48 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 48 inches.
2. 4- and 5-Inch NPS (DN100 and DN125): Maximum horizontal spacing, 48 inches with 5/8-inch minimum rod diameter; maximum vertical spacing, 48 inches.
3. 6-Inch NPS (DN150): Maximum horizontal spacing, 48 inches with 3/4-inch minimum rod diameter; maximum vertical spacing, 48 inches.
4. 8- through 12-Inch NPS (DN200 through DN300): Maximum horizontal spacing, 48 inches with 7/8-inch minimum rod diameter; maximum vertical spacing, 48 inches.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.08 CONNECTIONS

A. Connect service entrance piping to exterior sewerage and drainage piping. Use transition fitting to join dissimilar piping materials.

B. Connect drainage piping to service entrance piping, and extend to and connect to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Section 22 40 00 "Plumbing Fixtures."

2. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Section 22 10 13 - "Plumbing Specialties."

3. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections 2-1/2-inch NPS (DN65) and larger.

C. Connect force-main piping to service entrance piping, and extend to and connect to the following:

3.09 FIELD QUALITY CONTROL

A. Inspect drainage and vent piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

a. Roughing-In Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedure, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.

3. Roughing-In Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10 feet of head. Water level must not drop from 15 minutes before inspection starts through completion of inspection. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping

system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects using new materials and retest piping or portion thereof until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTING

A. Clean interior of piping system. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with 2 coats of water-based latex paint.

END OF SECTION

SECTION 22 14 23 - FACILITY NATURAL-GAS PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pipe, Fittings and Joining Materials.
2. Protective Coating.
3. Piping Specialties.
4. Valves.

B. Related Sections:

1. Section 09 90 00 - Paints and Coatings
2. Section 23 05 29 - Hangers and Supports
3. Section 23 05 00 - Basic Mechanical Materials and Methods
4. Section 22 30 00 - Plumbing Equipment

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating items selected for use in project.

B. Submit Product Data for the following:

1. Corrugated, stainless-steel tubing systems. Include associated components.
2. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Pressure regulators. Include pressure rating, capacity, and settings of selected models.

1.03 QUALITY ASSURANCE

A. ANSI Standard: Comply with ANSI Z223.1, "National Fuel Gas Code."

B. IAS Standard: Provide components listed in IAS's "Directory of A. G. A. and C. G. A Certified Appliances and Accessories" if specified to be IAS listed.

C. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

1.04 PROJECT CONDITIONS

A. Gas System Pressure: As indicated on Drawings

B. Design values of fuel gas supplied for these systems are as follows:

1. Nominal Heating Value: As indicated on Drawings.
2. Nominal Specific Gravity: As indicated on Drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Corrugated, Stainless-Steel Tubing Systems:
   a. Omega Flex, Inc. (800-355-1039)

b. Titeflex Corp. (800-765-2525)

c. Tru-Flex Metal Hose Corp. (800-255-6291)

2. Appliance Connector Valves:

a. B&K Industries, Inc. (800-782-2385)

b. Cimberio Valves, S. p. A. (800-367-6668)

c. Conbraco Industries, Inc.; Apollo Div. (704-847-9191)

3. Gas Valves, NPS 2 (DN 50) and Smaller:

a. Crane Valves (800-323-3679)

b. Milwaukee Valve Co., Inc. (414-744-5240)

c. Mueller Co.; Mueller Gas Products Div. (800-798-3131)

4. Plug Valves, NPS 2-1/2 (DN 65) and Larger:

a. Flow Control Equipment, Inc. (800-858-4158)

b. Milliken Valve Co., Inc. (610-861-8803)

c. Nordstrom Valves, Inc. (903-885-4691)

5. Automatic Gas Valves:

a. ASCO General Controls (800-423-2387)

b. ASCOLECTRIC, Ltd. (519-758-2700)

c. Honeywell, Inc. (800-328-5111)

6. Service Pressure Regulators:

a. American Meter Co. (215-830-1800)

b. Invensys Energy Metering. (800-375-8875)

c. Fisher Controls International, Inc. (800-558-5853)

2.02 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.03 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

A. Steel Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.

2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.

3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.

4. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.

5. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.

6. Joint Compound and Tape: Suitable for natural gas.

7. Steel Flanges and Flanged Fittings: ASME B16.5.

8. Gasket Material: Thickness, material, and type suitable for natural gas.

B. Transition Fittings: Type, material, and end connections to match piping being joined.

C. Common Joining Materials: Refer to Section 23 05 00 "Basic Mechanical Materials and Methods" for joining materials not in this Section.

2.04 PROTECTIVE COATING

A. Paint all exterior exposed gas piping with two coats of rust inhibitive paint.

2.05 PIPING SPECIALTIES

A. Flexible Connectors: ANSI Z21.24, copper alloy.

B. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

2.06 VALVES

A. Valves, NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

B. Valves, NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

C. Appliance Connector Valves: ANSI Z21.15 and IAS listed.

D. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig (13.8-kPa) minimum pressure rating.

E. Gas Valves, NPS 2 (DN 50) and Smaller: ASME B16.33 and IAS-listed bronze body and 125-psig pressure rating.

F. Plug Valves, NPS 2-1/2 (DN 65) and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.

G. General-Duty Valves, NPS 2-1/2 (DN 65) and Larger: ASME B16.38, cast-iron body, suitable for fuel gas service, with "WOG" indicated on valve body, and 125-psig pressure rating.

1. Gate Valves: MSS SP-70, OS&Y type with solid wedge.

H. Automatic Gas Valves: ANSI Z21.21, with electrical or mechanical operator for actuation by appliance automatic shutoff device.

I. Earthquake Valves: FM approved or listed in IAS Directory as complying with ANSI Z21.70 and UL listed. Include mechanical operator.

PART 3 EXECUTION

3.01 PREPARATION

A. Comply with ANSI Z223.1, "Prevention of Accidental Ignition" Paragraph.

3.02 SERVICE ENTRANCE PIPING

A. Extend fuel gas piping and connect to fuel gas distribution for service entrance to building.

1. Exterior fuel gas distribution system piping, service pressure regulator and service meter will be provided by gas utility. Confirm extent of work provided by the gas company.

3.03 PIPING APPLICATIONS

A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.

B. Fuel Gas Piping, 0.5 psig or Less: Use the following:

1. NPS 3/4 (DN 20) steel pipe, malleable-iron threaded fittings, and threaded joints.

2. NPS 3/4 and NPS 1 (DN 20 and DN 25): Steel pipe, malleable-iron threaded fittings, and threaded joints.
    a. Option: Soft copper tube, copper fittings, and brazed joints may be used for runouts at individual appliances.
3. NPS 1-1/4 to NPS 2 (DN 32 to DN 50): Steel pipe, malleable-iron threaded fittings, and threaded joints.
4. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Steel pipe, steel welding fittings, and welded joints.
5. Larger Than NPS 4 (DN 100): Steel pipe, steel welding fittings, and welded joints.

C. Fuel Gas Piping, 0.5 psig to 2.0 psi: Use the following:
1. NPS 3/4 (DN 20) Steel pipe, steel welding fittings, and welded joints.
2. NPS 3/4 and NPS 1 (DN 20 and DN 25): Steel pipe, steel welding fittings, and welded joints.
3. NPS 1-1/4 to NPS 2 (DN 32 to DN 50): Steel pipe, steel welding fittings, and welded joints.
4. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Steel pipe, steel welding fittings, and welded joints.
5. Larger Than NPS 4 (DN 100): Steel pipe, steel welding fittings, and welded joints.

3.04 VALVE APPLICATIONS

A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.

B. Appliance Shutoff Valves for Pressure 0.5 to 2 psig: Gas stop or gas valve.

C. Piping Line Valves, NPS 2 (DN 50) and Smaller: Gas valve.

D. Piping Line Valves, NPS 2-1/2 (DN 65) and Larger: Plug valve or general-duty valve.

E. Valves at Service Meter, NPS 2 (DN 50) and Smaller: Gas valve.

F. Valves at Service Meter, NPS 2-1/2 (DN 65) and Larger: Plug valve.

3.05 PIPING INSTALLATION

A. Refer to Division 23 Section 23 05 00 "Common Work Results for Plumbing" for basic piping installation requirements.

B. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.
1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
2. In Floors: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 may be installed in floors, subject to approval of authorities having jurisdiction. Surround piping cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.

3. In Floor Channels: Gas piping may be installed in floor channels, subject to approval of authorities having jurisdiction. Channels must have cover and be open to space above cover for ventilation.
4. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
    a. Exception: Tubing passing through partitions or walls.
5. In Walls: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 may be installed in masonry walls, subject to approval of authorities having jurisdiction.
6. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
    a. Exception: Accessible above-ceiling space specified above.

C. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.
    1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches (75 mm) long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.

D. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels, unless indicated to be exposed to view.

E. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.

F. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

G. Connect branch piping from top or side of horizontal piping.

H. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

I. Install corrugated, stainless-steel tubing system according to manufacturer's written instructions. Include striker plates to protect tubing from puncture where tubing is restrained and cannot move.

J. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.

K. Install flanges on valves, specialties, and equipment having NPS 2-1/2 (DN 65) and larger connections.

L. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

M. Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4 inches outside building, and vented to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end. Prepare and paint outside of conduits with coal-tar, epoxy-polyamide paint according to SSPC-Paint 16.

3.06 JOINT CONSTRUCTION

A. Refer to Section 23 05 00 "Common Work Results for HVAC" for basic piping joint construction.

B. Use materials suitable for fuel gas.

1. Brazed Joints: Make with brazing alloy with melting point greater than 1000 deg F. Brazing alloys containing phosphorus are prohibited.

3.07 HANGER AND SUPPORT INSTALLATION

A. Refer to Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment" for pipe hanger and support devices.

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 (DN 25) and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.

2. NPS 1-1/4 (DN 32): Maximum span, 108 inches; minimum rod size, 3/8 inch.

3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): Maximum span, 108 inches; minimum rod size, 3/8 inch.

4. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Maximum span, 10 feet; minimum rod size, 1/2 inch.

5. NPS 4 (DN 100) and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

3.08 CONNECTIONS

A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.

B. Install piping adjacent to appliances to allow service and maintenance.

C. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.

D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.

3.09 PAINTING

A. Use materials and procedures in Section 09 90 00 "Painting," "Paint Schedule" Article" and “Exterior Ferrous Metal" Paragraph".

B. Paint exterior service meters, pressure regulators, specialty valves, and piping.

1. Color: Gray.

3.10 FIELD QUALITY CONTROL

A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of authorities having jurisdiction.

B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

C. Report test results promptly and in writing to Owner’s Representative and authorities having jurisdiction.

D. Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.

E. Verify correct pressure settings for pressure regulators.

F. Verify that specified piping tests are complete.

3.11 ADJUSTING

A. Adjust controls and safety devices. Replace damaged and malfunctioning controls and safety devices.

END OF SECTION 23 14 23

SECTION 22 30 00 - PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Backflow Preventers.
2. Water Regulators.
3. Thermostatic Mixing Valves.
4. Clothes Washer Drain & Supply.
5. Hydrants.
6. Trap Primer Valves.
7. Drain Valves.
8. Backwater Valves.
9. Floor Drains.
10. Roof Drains.
11. Grease Interceptors.
12. Lint Interceptors.
13. Miscellaneous Piping Specialties.

B. Related Sections:

1. Section 00 43 10 – Break Out Pricing
2. Section 01 21 00 - Allowances
3. Section 01 23 00 - Alternates
4. Section 07 62 00 - Elastomeric Membrane Roofing.
5. Section 07 62 00 - Sheet Metal Flashing and Trim.
6. Section 22 05 00 - Common Work Results For Plumbing.
7. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
8. Section 22 05 23 - General Duty Valves for Plumbing Piping.
9. Section 22 05 19 - Meters and Gages for Plumbing Piping.
10. Section 22 11 16 - Domestic Water Piping.
11. Section 22 13 16 - Sanitary Waste and Vent Piping.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project.

B. Product Data: For each plumbing specialty indicated. Include rated capacities of selected equipment and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following plumbing specialty products:

1. Backflow preventers.
2. Water regulators.

3. Thermostatic mixing valves and water tempering valves.
4. Water hammer arresters.
5. Trap primer valves.
6. Drain valves.
7. Hydrants.
8. Clothes washer drain & supply.
9. Backwater valves.
10. Cleanouts.
11. Floor drains, open receptors, and trench drains.
12. Vent caps, vent terminals, and roof flashing assemblies.
13. Roof drains.
14. Lint traps.

C. Reports: Specified in "Field Quality Control" Article.

D. Maintenance Data: For specialties to include in the maintenance manuals specified in Division 1.

1.03 QUALITY ASSURANCE

A. Provide listing/approval stamp, label, or other marking on plumbing specialties made to specified standards.

B. Listing and Labeling: Provide electrically operated plumbing specialties specified in this Section that are listed and labeled.

1. Terms "Listed" and "Labeled": As defined in National Electrical Code, Article 100.

C. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

D. Comply with NFPA 70, "National Electrical Code," for electrical components.

1.04 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described in Section 01 78 43 “Spare Parts” below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Backflow Preventers:
    a. Watts Water Technologies, Inc. (978-688-1811)
    b. Zurn Industries, Inc.; Wilkins Div. (805-238-7100)
    c. Lawler
    d. Wilkins
2. Water Regulators:
    a. Conbraco Industries, Inc. (704-847-9191)
    b. Watts Water Technologies , Inc. (978-688-1811)

c. Zurn Industries, Inc.; Wilkins Div. (805-238-7100)

3. Thermostatic Water Mixing Valves:
   a. Lawler Manufacturing Co., Inc. (800-763-2709)
   b. Leonard Valve Co. (401-461-1200)
   c. Symmons Industries, Inc. (617-848-2250)
   d. Powers
4. Clothes Washer Drain & Supply
   a. Acorn Engineering Co. (800-488-8999)
   b. Guy Gray Manufacturing Co., Inc., IPS Corporation (800-421-2677)
   c. Symmons Industries, Inc. (617-848-2250)
5. Hydrants:
   a. Jay R. Smith Mfg. Co., Division of Smith Industries (334-277-8520)
   b. Woodford Manufacturing Co. (719-574-0600)
   c. Zurn Industries, Inc.; Hydromechanics Div. (814-455-0921)
6. Water Hammer Arresters:
   a. Precision Plumbing Products, Inc. (503-256-4010)
   b. Sioux Chief Manufacturing Co., Inc. (816-779-6104)
   c. Jay R. Smith Mfg. Co., Division of Smith Industries (334-277-8520)
7. Trap Primer Valves:
   a. Precision Plumbing Products, Inc. (503-256-4010)
   b. Jay R. Smith Mfg. Co., Division of Smith Industries (334-277-8520)
   c. Watts Water Technologies , Inc. (978-688-1811))
   d. Zurn Industries, Inc.; Hydromechanics Div. (814-455-0921)
8. Backwater Valves:
   a. Jay R. Smith Mfg. Co., Division of Smith Industries (334-277-8520)
   b. Watts Water Technologies , Inc. (978-688-1811)
   c. Zurn Industries, Inc.; Hydromechanics Div. (814-455-0921)
9. Floor Drains
   a. Jay R. Smith Mfg. Co., Division of Smith Industries (334-277-8520)
   b. Josam Co. (800-365-6726)
   c. Zurn Industries, Inc. (814-455-0921)
   d. Watts
10. Roof Drains,
   a. Jay R. Smith Mfg. Co., Division of Smith Industries (334-277-8520)
   b. Josam Co. (800-365-6726)
   c. Zurn Industries, Inc. (814-455-0921)
   d. Watts

11. GREASE INTERCEPTORS
    a. Jay R. Smith Mfg. Co., Division of Smith Industries (334-277-8520)
    b. Josam Co. (800-365-6726)
    c. Zurn Industries, Inc.; Jonespec Div. (814-455-0921)
12. LINT INTERCEPTORS
    a. Jay R. Smith Mfg. Co., Division of Smith Industries (334-277-8520)
    b. Josam Co. (800-365-6726)
    c. Zurn Industries, Inc. (814-455-0921)
    d. H-M Company

2.02 BACKFLOW PREVENTERS

A. General: ASSE standard, backflow preventers, of size indicated for maximum flow rate and maximum pressure loss indicated.

1. Body: Bronze, with flanged ends.
    a. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.
2. Interior Components: Corrosion-resistant materials.
3. Exterior Finish: Rough Brass.
4. Strainer on inlet.
5. Test Kit with Plastic Case: Per manufacturer's recommendation.

B. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.

C. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7 garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.

D. Intermediate Atmospheric-Vent Backflow Preventers: ASSE 1012, suitable for continuous pressure application. Include inlet screen and 2 independent check valves with intermediate atmospheric vent.

E. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between 2 positive-seating check valves.

1. Pressure Loss: 12 psig maximum, through middle one-third of flow range.

F. Double-Check Backflow Prevention Assemblies: ASSE 1015, suitable for continuous pressure application. Include shutoff valves on inlet and outlet, and strainer on inlet; and test cocks with 2 positive-seating check valves.

1. Pressure Loss: 5 psig maximum, through middle one-third of flow range.

G. Antisiphon-Pressure-Type Vacuum Breakers: ASSE 1020, suitable for continuous pressure application. Include shutoff valves, spring-loaded check valve, spring-loaded floating disc, test cocks, and atmospheric vent.

1. Pressure Loss: 5 psig maximum, through middle one-third of flow range.

2.03 WATER REGULATORS

A. General: ASSE 1003, water regulators, rated for initial working pressure of 150 psig minimum, of size, flow rate, and inlet and outlet pressures indicated. Include integral factory-installed or separate field-installed Y-pattern strainer.

1. 2-Inch NPS (DN50) and Smaller: Bronze body with threaded ends.
2. 2-1/2-Inch NPS (DN65) and Larger: Bronze or cast-iron body with flanged ends. Include AWWA C550 or FDA-approved interior epoxy coating for regulators with cast-iron body.
3. Interior Components: Corrosion-resistant materials.
4. Exterior Finish: Standard
5. Single-seated, direct-operated type.

B. Single-seated, direct-operated, integral-bypass type.

C. Pilot-operated type, single- or double-seated, cast-iron-body main valve, with bronze-body pilot valve.

2.04 THERMOSTATIC MIXING VALVES

A. General: ASSE 1017, manually adjustable, thermostatic water mixing valve with bronze body. Include check stop and union on hot- and cold-water-supply inlets, adjustable temperature setting, and capacity at pressure loss as indicated.

1. Bimetal Thermostat, Operation and Pressure Rating: 125 psig minimum.

B. Thermostatic Water Mixing Valves: Unit, with the following:

1. Piping, of sizes and in arrangement indicated. Include valves and unions.
2. Piping Component Finish: Rough brass.
3. Thermometer: Manufacturer's standard.

2.05 CLOTHES WASHER DRAIN & SUPPLY

A. General: Recessed-mounting outlet boxes with fittings complying with ASME A112.18.1M. Include box with faceplate, services indicated for equipment connections, and wood-blocking reinforcement.

B. Clothes Washer Outlet Boxes: With hose connections, drain, and the following:

1. Box and Faceplate: Plastic.
2. Shutoff Fittings: 2 hose bibbs.
3. Supply Fittings: Two 1/2-inch NPS (DN15) gate, globe, or ball valves and 1/2-inch NPS (DN15) copper, water tubing.
4. Drain Fitting: 2-inch NPS (DN50) drainage piping P-trap with 2-inch NPS (DN50) standpipe extending from floor to outlet box and 2-inch NPS (DN50) waste.

2.06 HYDRANTS

A. Wall Hydrants: ASME A112.21.3M, nonfreeze, key operation. Provide one operating key.

1. Inlet: 3/4- or 1-inch NPS (DN20 or DN25) threaded or solder joint.
2. Outlet: ASME B1.20.7 garden-hose threads, and integral or field-installed, nonremovable, drainable, hose-connection vacuum breaker with ASME B1.20.7 garden-hose threads on outlet.
3. Type: Projecting.
4. Finish: Nickel bronze.

B. Wall Hydrants: ASME A112.21.3M or ASSE 1019, nonfreeze, automatic draining, anti-back flow type, key operation, with 3/4- or 1-inch NPS (DN20 or DN25) threaded or solder-joint inlet, and ASME B1.20.7 garden-hose threads on outlet. Include operating key for each hydrant.

1. Type: Recessed
2. Finish: Nickel bronze.

2.07 TRAP PRIMER VALVES

A. Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:

1. 125-psig minimum working pressure.
2. Bronze body with atmospheric-vented drain chamber.
3. Inlet and Outlet Connections: 1/2-inch NPS (DN15) threaded, union, or solder joint.
4. Gravity Drain Outlet Connection: 1/2-inch NPS (DN15) threaded or solder joint.
5. Finished: Rough bronze.

2.08 DRAIN VALVES

A. Hose-End Drain Valves: MSS SP-110, 3/4-inch NPS (DN20) ball valve, rated for 400-psig minimum CWP. Include 2-piece, ASTM B 62 bronze body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

1. Inlet: Threaded or solder joint.
2. Outlet: Short-threaded nipple with ASME B1.20.7 garden-hose thread and cap.
3. Hose-End Drain Valve Option: MSS SP-80, gate valve, Class 125, ASTM B 62 body, with 3/4-inch NPS (DN20) threaded or solder-joint inlet and ASME B1.20.7 garden-hose threads on outlet and cap. Hose bibbs are prohibited for this application.

B. Stop-and-Waste Drain Valves: MSS SP-110, ball valve, rated for 200-psig minimum CWP or MSS SP-80, Class 125, gate valve; ASTM B 62 bronze body, with 1/8-inch NPS (DN6) side drain outlet and cap.

2.09 FLOOR DRAINS

A. Floor Drains,: Comply with ASME A112.21.1M and ASME A112.3.1. See plans for schedule.

2.10 ROOF DRAINS

A. Roof Drains, (RD-1): Comply with ASME A112.21.2M and ASME A112.3.1. See plans for schedule.

2.11 GREASE INTERCEPTORS: Comply with PDI-G101.

A. Plumbing and Drainage Institute Seal: Required.

B. Body Matrerial: Cast iron.

C. Body Extension: Required.

D. Flow Rate: 10 GPM for interior location, 100 GPM (6.3 L/s) limited rate for exterior.

E. Grease Retention Capacity: 20 lb. for interior location, 200 lb. (90.7kg) limited rate for exterior.

F. Inlet and Outlet Size: 2” for interior location, 4” for exterior location.

G. Cleanout: Integral or field installed on outlet.

1. Mounting: Above floor, recessed, flush with floor, recessed in acid-resistant, coated steel frame and cradle.

2. Operation: Manual Cleaning.

2.12 LINT INTERCEPTORS

A. See plans for equipment notes.

2.13 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASME A112.26.1M, ASSE 1010, or PDI-WH 201, bellows or piston type with pressurized cushioning chamber. Sizes are based on water-supply fixture units, ASME A112.26.1M sizes A through F and PDI-WH 201 sizes A through F.

B. Roof Flashing Assemblies: Refer to Section 07 31 -13.

C. Open Drains: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section of length to provide depth indicated; and where indicated, increaser fitting of size indicated, joined with ASTM C 564 rubber gaskets. Size P-trap as indicated.

D. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

E. Air-Gap Fittings: ASME A112.1.2, cast iron or cast bronze, with fixed air gap, inlet for drain pipe or tube, and threaded or spigot outlet.

F. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.

G. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.

H. Vent Terminals: Commercially manufactured, shop-fabricated or field-fabricated, frost-proof assembly constructed of galvanized steel, copper, or lead-coated copper. Size to provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counter flashing, as indicated.

I. Expansion Joints: ASME A112.21.2M, assembly with cast-iron body with bronze sleeve, packing gland, and packing, of size and end types corresponding to connected piping.

PART 3 EXECUTION

3.01 PLUMBING SPECIALTY INSTALLATION

A. General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.

B. Install backflow preventers of type, size, and capacity indicated, at each water-supply connection to mechanical equipment and systems, and to other equipment and water systems as indicated. Comply with authorities having jurisdiction. Locate backflow preventers in same room as connected equipment. Install air-gap fitting on units with atmospheric-vent connection and pipe relief outlet drain to nearest floor drain. Do not install bypass around backflow preventer.

C. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet. Refer to Section 22 05 19 “Meters and Gauges for Plumbing Piping”.

D. Install hose bibbs with integral or field-installed vacuum breaker.

E. Install wall hydrants with integral or field-installed vacuum breaker.

F. Install trap seal primer valves in accessible locations with valve outlet piping pitched down toward drain trap a minimum of one percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow. Identify device locations on record drawings.

G. Install backwater valves in building drain piping as indicated. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

H. Install expansion joints on vertical risers, stacks, and conductors as indicated.

I. Install cleanouts in aboveground piping and building drain piping as indicated, and where not indicated, according to the following:

1. Size same as drainage piping up to 4-inch NPS (DN100). Use 4-inch NPS (DN100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping 4-inch NPS (DN100) and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

J. Install cleanout deck plates, of types indicated, with top flush with finished floor, for floor cleanouts for piping below floors.

K. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

L. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.

M. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.

N. Install frost-proof vent caps on each vent pipe passing through roof (where required). Maintain 1-inch clearance between vent pipe and roof substrate.

O. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor or as indicated. Size outlets as indicated.

P. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

1. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
2. Radius, 30 to 60 Inches: Equivalent to one percent slope.
3. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

Q. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

R. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

S. Position floor drains for easy access and maintenance.

T. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions. Size outlets as indicated.

U. Install roof-drain flashing collar or flange so no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.

V. Position roof drains for easy access and maintenance.

W. Install interceptors, including trapping, venting, and flow control fitting, according to authorities having jurisdiction and with clear space for servicing.

1. Above-Floor Installation: Set unit with bottom resting on floor, unless otherwise indicated.

2. Flush with Floor Installation: Set unit and extension if required, with cover flush with finished floor.
3. Recessed Floor Installation: Set unit in receiver housing having bottom or cradle supports, with receiver housing cover flush with finished floor.
4. Install clean out immediately downstream from interceptors not having integral cleanout on outlet.

X. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

Y. Secure supplies to supports or substrate.

Z. Install individual stop valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated.

AA. Install water-supply stop valves in accessible locations.

BB. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

CC. Locate drainage piping as close as possible to bottom of floor slab supporting fixtures and drains.

DD. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

EE. Include wood-blocking reinforcement for recessed and wall-mounting plumbing specialties.

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing specialties and piping specified in other Division 15 Sections.
2. Install piping connections indicated between appliances and equipment specified in other Sections; connect directly to plumbing piping systems.
3. Install piping connections indicated as indirect wastes from appliances and equipment specified in other Sections, to spill over receptors connected to plumbing piping systems.

B. Install hoses between plumbing specialties and appliances as required for connections.

C. Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power is specified in Division 16 Sections.

D. Supply Runouts to Plumbing Specialties: Install hot- and cold-water-supply piping of sizes indicated, but not smaller than required by authorities having jurisdiction.

E. Drainage Runouts to Plumbing Specialties: Install drainage and vent piping, with approved trap, of sizes indicated, but not smaller than required by authorities having jurisdiction.

F. Interceptor Connections: Connect piping, flow-control fittings, and accessories as indicated.

1. Grease Interceptors: Connect inlet and outlet to unit, and flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.
2. Solids Interceptors: Connect inlet and outlet.

G. Ground electric-powered plumbing specialties.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FLASHING INSTALLATION

A. Fabricate flashing manufactured from single piece unless large pans, sumps, or other drainage shapes are required.

B. Burn joints of lead sheets where required.

C. Solder joints of copper sheets where required.

D. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

E. Set flashing on floors and roofs in solid coating of bituminous cement.

F. Secure flashing into sleeve and specialty clamping ring or device.

G. Install flashing for piping passing through roofs with counter flashing or commercially made flashing fittings, according to Division 7 Section 07620 "Flashing and Sheet Metal”.

H. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

I. Fabricate and install flashing and pans, sumps, and other drainage shapes as indicated. Install drain connection if indicated.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of factory-authorized service representative to supervise the field assembly of components and installation of grease recovery units, including piping and electrical connections, and to report results in writing.

1. Test and adjust plumbing specialty controls and safeties. Replace damaged and malfunctioning controls and components.

3.05 COMMISSIONING

A. Before startup, perform the following checks:

1. System tests are complete.
2. Damaged and defective specialties and accessories have been replaced or repaired.
3. Clear space is provided for servicing specialties.

B. Before operating systems, perform the following steps:

1. Close drain valves, hydrants, and hose bibbs.
2. Open general-duty valves to fully open position.
3. Remove and clean strainers.
4. Verify that drainage and vent piping are clear of obstructions. Flush with water until clear.

C. Startup Procedures: Follow manufacturer's written instructions.

D. Adjust operation and correct deficiencies discovered during commissioning.

3.06 DEMONSTRATION

A. Startup Services: Engage a factory-authorized service representative to perform startup services and train Owner's maintenance personnel in Section 01820 and as specified below:

1. Train Owner's maintenance personnel on procedures and schedules related to startup of and servicing interceptors.
2. Train Owner's maintenance personnel on procedures and schedules related to startup of and servicing grease recovery units.

3.07 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 30 00

SECTION 22 34 00 - FUEL-FIRED, DOMESTIC WATER HEATERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Gas fired water heaters.
2. Storage tanks
3. Expansion tanks.
4. Accessories.

B. Related Sections:

1. Section 03 30 00 - Cast-in-Place Concrete
2. Section 22 05 00 - Common Work Results for Plumbing
3. Section 22 05 23 - General Duty Valves for Plumbing Piping
4. Section 22 05 19 - Meters and Gages for Plumbing Piping
5. Section 22 30 00 - Plumbing Equipment

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. For each type and size of water heater, include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

b. Wiring Diagrams: Power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring.

2. Product Certificates: Signed by manufacturers of water heaters certifying that products furnished comply with requirements.

3. Maintenance Data: For water heaters to include in maintenance manuals specified in Division 1.

4. Warranties: Special warranties specified in this Section.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of water heaters and are based on specific units indicated.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. ANSI Compliance: Provide gas water heaters that comply with ANSI standards for gas water heaters and related products and that bear AGA certification label.

E. ASME Compliance: Fabricate and label water heater, hot-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

F. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:

1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

1.04 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include storage tanks, circulators, and burner assemblies.

2. Warranty Period: From date of Substantial Completion:

a. Storage Tanks: Five (5) years.

b. Circulators and Burner Assemblies: One (1) Year.

c. Boilers: Five (5) Year Leakage, One (1) Year Parts.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers

1. Gas Fired Water Heaters: (High Efficiency, Separated Combustion)

a. Lochinvar Corp. (615-889-8900)

b. A. O. Smith Water Products Co. (800-447-1953) - National Accounts Department

c. Teledyne Laars (603) 335-6300).

d. Raypak, Inc. (805-278-5300)

e. RBI Water Heaters (413-564-5515)

2. Expansion Tanks:

a. Amtrol, Inc. (800-947-2324)

b. Smith: A. O. Smith Water Products Co. (800-447-1953) - National Accounts Department

c. Wessels Co. (313-875-5000)

d. Taco, Inc. (401-942-8000)

2.02 GAS FIRED WATER HEATERS (HIGH EFFICIENCY)

A. Description: Configuration and components complying with appropriate requirements of ANSI Z21.13 and UL 795, with nominal efficiency rating not less than 83.7 percent.

B. Unit Construction: ASME code with 160-psig working-pressure rating.

1. Tappings: Factory fabricated of materials compatible with tank for piping and other connections as required. Attach tappings to unit before testing and labeling.

a. NPS 2 (DN50) and Smaller: Threaded ends according to ASME B1.20.1, pipe threads.

b. NPS 2-1/2 (DN65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

2. Interior Finish: Corrosion-resistant metal or materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

3. Insulation: Comply with ASHRAE 90.1.

4. Jacket: Steel, with enameled finish.

C. Burner: For use with natural-gas fuel, and complying with appropriate requirements of UL 795.

D. Hot-Water Storage Tank: Connected with piping to circulator and water heater.

1. Construction: According to ASME Boiler and Pressure Vessel Code: Section VIII, steel with 125-psig working-pressure rating.

a. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rods, and controls as required. Attach tappings to tank shell before testing and labeling.

1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1, pipe threads.

2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME 16.24 for copper and copper-alloy flanges.

b. Interior Finish: Materials and thicknesses complying with NSF 61, barrier material for potable water tank linings. Extend finish into and through tank fittings and outlets.

c. Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.

2. Anode Rods: Factory installed, magnesium.

3. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.

E. Circulator: UL 778, all bronze, in-line, centrifugal, single-stage, radially split case design, with mechanical seals; with 125-psig minimum working-pressure rating and 225 deg F continuous water temperature.

F. Piping: Manufacturer’s standard copper tubing.

2.03 EXPANSION TANKS

A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.

B. Construction: 150-psig working-pressure rating.

C. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1, pipe thread.

D. Tank Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

E. Tank Exterior Finish: Manufacturer's standard, unless finish is indicated.

F. Air-Charging Valve: Factory installed.

2.04 WATER HEATER ACCESSORIES

A. Combination Temperature and Pressure Relief Valves: According to the following:

1. Gas Water Heaters: ANSI Z21.22, combination temperature and pressure relief valve.

2. Option: Separate temperature and pressure relief valves are acceptable instead of combination relief valve.

B. Pressure Relief Valves: According to the following:

1. Gas Water Heaters: ANSI Z21.22 pressure relief valve for storage tanks of 200,000 Btuh (58.6 kW).

C. Vacuum Relief Valves: According to the following:

1. Gas Water Heaters: ANSI Z21.22.

2. Exception: Omit if water heater has integral vacuum-relieving device.

D. Gas Shutoff Valves: ANSI Z21.15, manually operated. Furnish for installation in piping.

E. Gas Pressure Regulators: ANSI Z21.18, appliance type, factory or field installed. Include pressure rating, capacity, and pressure differential required for water heater and gas supply.

F. Automatic Valves: ANSI Z21.21, appliance, electrically operated, on-off automatic valve.

G. Piping Manifold Kits: Water heater manufacturer's factory-fabricated inlet and outlet piping arrangement for multiple-unit installation. Include piping and valves for field assembly that is capable of isolating each water heater and of providing balanced flow through each water heater.

H. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE 90.1 or ASHRAE 90.2.

PART 3 EXECUTION

3.01 WATER HEATER INSTALLATION

A. Install commercial water heaters on concrete bases.

1. Exception: Omit concrete bases for commercial water heaters if installation on stand, bracket, suspended platform, or direct on floor is indicated.

B. Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

C. Anchor water heaters to substrate.

D. Where required, install seismic restraints for water heaters. Anchor to substrate.

E. Install and connect gas water heaters according to NFPA 54.

1. Install appliance, gas pressure regulators on gas-burner inlets of water heaters without pressure regulators.

2. Install vent piping from gas-train pressure regulators and valves to outside of building where required. Terminate vent piping with brass-screened vent cap fitting. Do not combine vents except with approval of authorities having jurisdiction.

F. Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

G. Install pressure relief valves in water piping for water heaters without storage. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

H. Install vacuum relief valves in cold-water-inlet piping.

I. Install vacuum relief valves in water heater storage tanks that have copper lining.

J. Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Section 22 30 00 "Plumbing Equipment" for drain valves.

K. Install thermometers on water heater inlet and outlet piping. Refer to Section 22 05 19 "Meters and Gages for Plumbing Piping" for thermometers.

L. Assemble and install inlet and outlet piping manifold kits for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each water heater. Include shutoff valve, and thermometer in each water heater inlet and outlet, and throttling valve in each water heater outlet. Refer to Section 22 05 23 "General Duty Valves for Plumbing Piping" and Section 22 05 19 "Meters and Gages for Plumbing Piping" for thermometers.

M. Arrange for insulation on equipment and piping not furnished with factory-applied insulation.

N. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.

O. Fill water heaters with water.

P. Charge compression tanks with air as required by manufacturer.

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

C. Connect hot- and cold-water piping with shutoff valves and unions. Connect hot-water-circulating piping with shutoff valve, check valve, and union.

D. Connect gas piping to gas burner with drip leg, tee, shutoff valve, and union; minimum size same as inlet connection.

E. Make connections with dielectric fittings where piping is made of dissimilar metal.

F. Gas, Water Heater Vent Connections: Connect to vent system. Include draft hoods and diverters where required. Use vents same size as or larger than water heater outlets, but not smaller than indicated unless smaller vent size has been calculated according to NFPA 54. Comply with gas utility requirements for sizing. Provide ducted combustion air.

G. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.

H. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

A. Engage a factory-authorized service representative to perform startup service.

B. In addition to manufacturer's written installation and startup checks, perform the following:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment and retest until satisfactory results are achieved.

2. Verify that piping system tests are complete.

3. Check for piping connection leaks.

4. Check for clear relief valve inlets, outlets, and drain piping.

5. Check operation of circulators.

6. Test operation of safety controls, relief valves, and devices.
7. Energize electric circuits.
8. Adjust operating controls.
9. Adjust hot-water-outlet temperature settings. Do not set above 140 deg F unless piping system application requires higher temperature.
10. Balance water flow through manifolds of multiple-unit installations.

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water heaters.

1. Conduct training as specified in Section 01 79 00 "Training".
2. Train Owner's maintenance personnel on procedures for starting and stopping troubleshooting, servicing, and maintaining equipment.

END OF SECTION 22 34 00

SECTION 22 42 00 - PLUMBING FIXTURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Plumbing Fixture Standards
2. Miscellaneous Fixture Standards
3. Miscellaneous Component Standards

B. Related Sections:

1. Section 00 43 10 – Break Out Pricing
2. Section 01 21 00 - Allowances
3. Section 01 23 00 - Alternates
4. Section 07 92 00 - Joint Sealants: For sealing between fixtures and walls, floors, and counters.
5. Section 22 05 23 - General Duty Valves for Plumbing Piping
6. Section 22 30 00 - Plumbing Equipment

1.02 DEFINITIONS

A. Accessible: Plumbing fixture, building, facility, or portion thereof that can be approached, entered, and used by physically handicapped, disabled, and elderly people.

B. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, traps and waste pipes. Pipe fittings, tube fittings, and general-duty valves are included where indicated.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data for each plumbing fixture category and type specified. Include selected fixture, trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
2. Maintenance data for plumbing fixtures and components to include in the operation and maintenance manuals specified in Division 1.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category from one source and by a single manufacturer.

1. Exception: Where fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for this category.

B. Regulatory Requirements: Comply with requirements of CABO A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; regarding plumbing fixtures for physically handicapped people.

C. Energy Policy Act Requirements: Comply with requirements of Public Law 102-486, "Energy Policy Act," regarding water flow rate and water consumption of plumbing fixtures.

D. Listing and labeling: Provide electrically operated fixtures and components specified in this Section that are listed and labeled.

E. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver plumbing fixtures in manufacturer's protective packing, crating, and covering.

B. Store plumbing fixtures on elevated platforms in dry location.

1.06 PROJECT CONDITIONS

A. Field Measurements: Coordinate roughing-in and final fixture locations and verify that plumbing fixtures can be installed to comply with original design and referenced standards.

1.07 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described in Section 01 78 43 “Spare Parts” that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. **See Plumbing Fixture Matrix for list of which Manufacturer's are approved for use on a specific item.**

B. Avendra, LLC Preferred Manufactures:

1. None.

C. Approved Manufacturers:

1. American Standard, Inc. (732-980-3234)
2. Elkay Manufacturing Co. (630-574-8484)
3. Fiat Products Ltd.; Division of Crane Plumbing (847-864-9777)
4. Halsey Taylor (630-574-3500)
5. Haws Corp. (510-525-5801)
6. Jay R. Smith Mfg. Co. (334-277-8520)
7. Josam Co. (800-365-6726)
8. Just Mfg. Co. (847-678-5190)
9. Kohler Co. (800-456-4537)
10. E. L. Mustee & Sons, Inc. (800-321-3128)
11. Oasis Industries Inc. (800-323-2748)
12. Sunroc Corp (800-4SUNROC)
13. Waterpik Technologies, Inc. (800-766-7338)
14. Toto USA, Inc. (800-350-8686)
15. Wade Division of Tyler Pipe (800-874-9201)

16. Western Emergency Equipment (800-758-9378)
17. Stern-Williams (913-362-5635)
18. Zurn Industries, Inc. (716-665-1132)

2.02 PLUMBING FIXTURE STANDARDS

A. Comply with applicable standards below and other requirements specified.

1. Electric Water Coolers: ARI 1010 and UL 399.
2. Emergency Equipment: ANSI Z358.1.
3. National Sanitation Foundation Construction: NSF 2 and NSF 61.
4. Bathtubs: ANSI Z124.1, ANSI Z124.1a, and ANSI Z124.1b.
5. Plastic Laundry Trays: ANSI Z124.6.
6. Plastic Mop-Service Basins: ANSI Z124.6.
7. Shower Enclosures: ANSI Z124.2 and ANSI Z124.2a.
8. Porcelain-Enameled Fixtures: ASME A112.19.4M.
9. Slip-Resistant Bathing Surfaces: ASTM F 462.
10. Stainless-Steel Fixtures Other than Service Sinks: ASME A112.19.3M.
11. Vitreous-China Fixtures: ASME A112.19.2M.
12. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
13. Water-Closet, Flushometer Tank Trim: ASSE 1037.

2.03 LAVATORY/SINK FAUCET STANDARDS

A. Comply with ASME A112.18.1M, NSF 61 and other requirements specified for lavatory, sink, and similar-type-fixture faucet fittings. Include hot- and cold-water indicators; see drawings for maximum flow rates; and finish as shown on Plumbing Fixture Schedule on metal body. Coordinate faucet inlets with supplies and fixture holes and outlet with spout and fixture receptor.

1. Faucet:
    a. Valve shall be ceramic discs in cartridge assembly.
    b. Handles as indicated.
    c. Pop-up or grid drain as indicated.
2. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
3. Faucet Hose: ASTM D 3901.
4. Hose-Connection Vacuum Breakers: ASSE 1011.
5. Hose-Coupling Threads: ASME B1.20.7.
6. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
7. Pipe Threads: ASME B1.20.1.
8. Sink Spray Hoses: ASTM D 3573.

2.04 BATHTUB/SHOWER FAUCET STANDARDS

A. Comply with ASME A112.18.1M and other requirements specified for bathtub and shower faucet fittings. Include hot- and cold-water indicators; 2.0-gpm-maximum flow rate; and finish as shown on Plumbing Fixture Schedule. Coordinate faucet inlets with supplies and outlet with diverter valve; tub spout; and shower head, arm, and flange.

1. All Trim to be metallic.
2. Valving shall be ceramic discs in cartridge assemblies.
3. Cast brass valve-body with integral cast-in service stops.
4. Pressure balancing faucets shall utilize a diaphragm-balancing cartridge with integral check valves.
5. Combination, Pressure-Equalizing- and Thermostatic-Control, Antiscald Faucets: ASSE 1016.
6. Pressure balancing faucets shall utilize a diaphragm-balancing cartridge with integral check valves.
7. Hand-Held Showers: ASSE 1014.
8. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
9. Hose-Coupling Threads: ASME B1.20.1 or ASME B1.20.7.
10. Manual-Control Antiscald Faucets: ASTM F 444.
11. Pipe Threads: ASME B1.20.1.
12. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
13. Thermostatic-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.

2.05 MISCELLANEOUS FITTING STANDARDS

A. Comply with ASME A112.18.1M and other requirements specified for fittings, other than faucets. Include finish to coordinate with finishes shown on Plumbing Fixture Schedule. Coordinate fittings with other components and connectors.

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Automatic Flow Restrictors: ASSE 1028.
3. Brass and Copper, Supplies and Tubular Brass: ASME A112.18.1M.
4. Fixed Flow Restrictors: ASSE 1034.
5. Manual-Operation Flushometers: ASSE 1037.

2.06 MISCELLANEOUS COMPONENT STANDARDS

A. Comply with applicable standards below and other requirements specified for components for plumbing fixtures, equipment, and appliances.

1. Disposers: ASSE 1008 and UL 430.
2. Floor Drains: ASME A112.21.1M.
3. Hose-Coupling Threads: ASME B1.20.7.
4. Pipe Threads: ASME B1.20.1.
5. Plastic Shower Receptors: ANSI Z124.2 and ANSI Z124.2a.
6. Plastic Toilet Seats: ANSI Z124.5.
7. Supply and Drain Insulation Kits: CABO A117.1.

8. Supports: ASME A112.6.1M.

2.07 FITTINGS

A. Fittings for Plumbing Fixtures: Refer to plumbing fixture schedules in the Appendix for materials for supplies, supply stops, supply risers, traps, and other fittings.

B. Fittings for Equipment Specified in Other Sections: Fittings include the following:

1. Supply Inlets: Brass pipe or copper tube, size required for final connection.

2. Supply Stops: Chrome-plated brass, angle or straight; compression, loose-key type; same size as supply inlet and with outlet matching supply riser.

3. Supply Risers: 3/8-inch NPS (DN10) rigid brass tube with 1/4-inch NPS (DN8) offset, knob-end tailpiece. Use chrome-plated tube for exposed applications.

4. Traps: Tubular brass with 0.045-inch wall thickness, slip-joint inlet, cleanout, wall flange, escutcheons, and size to match equipment. Use chrome-plated tube for exposed applications.

5. Continuous Waste: Tubular brass, 0.045-inch wall thickness, with slip-joint inlet, and size to match equipment.

6. Indirect Waste: Tubular brass, 0.045-inch wall thickness, and size to match equipment.

2.08 FINISHES

A. Refer to Plumbing Fixture Matrix for Finishes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine roughing-in for potable, hot- and cold-water supply piping systems; soil, waste, and vent piping systems; and supports. Verify that locations and sizes of piping and locations and types of supports match those indicated, before installing and connecting fixtures. Use manufacturer's roughing-in data when roughing-in data are not indicated.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

A. Include supports for plumbing fixtures according to the following:

1. Carriers: For wall-hanging water closets and fixtures supported from wall construction.

2. Chair Carriers: For wall-hanging urinals, lavatories, sinks, drinking fountains, and electric water coolers.

3. Heavy-Duty Chair Carriers: For accessible urinals, lavatories, and other fixtures where indicated.

4. Reinforcement: For floor-mounted lavatories and sinks that require securing to wall and recessed, box-mounted, electric water coolers.

5. Fabricate reinforcement from 2-by-4-inch or 2-by-6-inch fire-retardant-treated-wood blocking between studs or 1/4-by-6-inch steel plates attached to studs, in wall construction, to secure fixtures to wall. Include length that will extend beyond ends of fixture mounting bracket and attach to at least 2 studs.

B. Include fitting insulation kits for accessible fixtures according to the following:

1. Lavatories: Cover hot- and cold-water supplies, stops and handles, drain, trap, and waste to wall.

2. Sinks: Cover hot- and cold-water supplies, stops and handles, drain, trap, and waste to wall.

3. Fixtures with Offset Drain: Cover hot- and cold-water supplies, offset drain, trap, and waste to wall.

4. Other Fixtures: Cover exposed fittings below fixture.

3.03 PLUMBING FIXTURE INSTALLATION

A. Assemble plumbing fixtures and trim, fittings, faucets, and other components according to manufacturers' written instructions.

B. Install fixtures level and plumb according to manufacturers' written instructions, roughing-in drawings, and referenced standards.

C. Install floor-mounted, floor-outlet water closets with closet flanges and gasket seals.

D. Install shower arm elbow fitting secure to backing to prevent movement.

E. Install toilet seats on water closets.

F. Install wall-hanging, back-outlet urinals with gasket seals.

G. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for handicapped people to reach.

H. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

I. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.

J. Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.

K. Fasten wall-mounted fittings to reinforcement built into walls.

L. Fasten counter-mounting plumbing fixtures to casework.

M. Secure supplies to supports or substrate within pipe space behind fixture.

N. Set shower receptors and mop basins in leveling bed of cement grout.

O. Install individual stop valve in each water supply to fixture. Use gate or globe valve where specific stop valve is not specified.

1. Exception: Omit stop valves on supplies to emergency equipment, except when permitted by authorities having jurisdiction. When permitted, install valve chained and locked in OPEN position.

P. Install water-supply stop valves in accessible locations.

Q. Install faucet, laminar-flow fittings with specified flow rates and patterns in faucet spouts when faucets are not available with required rates and patterns. Include adapters when required.

R. Install supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.

S. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts when faucets are not available with required rates and patterns. Include adapters when required.

T. Install shower, flow-control fittings with specified maximum flow rates in shower arms.

U. Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes, except where otherwise indicated.

V. Install disposers in sink outlets. Install switch where indicated, or in wall adjacent to sink if location is not indicated.

W. Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.

X. Seal joints between fixtures and walls, floors, and counters using sanitary-type, 1-part, mildew-resistant, silicone sealant according to sealing requirements specified in Section 07 92 00 "Joint Sealants." Match sealant color to fixture color.

3.04 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other Division 22 Sections.

B. Supply and Waste Connections to Plumbing Fixtures: Refer to plumbing fixture schedules at the end of this Section for fitting sizes and connection requirements for each plumbing fixture.

C. Supply and Waste Connections to Equipment Specified in Other Sections: Connect equipment with supply inlets, supply stops, supply risers, and traps specified in this Section. Use fitting sizes required to match connected equipment. Connect fittings to plumbing piping.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

E. Arrange for electric-power connections to fixtures and devices that require power. Electric power is specified in Division 16 Sections.

3.05 FIELD QUALITY CONTROL

A. Verify that installed fixtures are categories and types specified for locations where installed.

B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized and demonstrate proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.06 ADJUSTING AND CLEANING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust disposers, hot-water dispensers, and controls. Replace damaged and malfunctioning units and controls.

C. Adjust water pressure at drinking fountains, electric water coolers, faucets, shower valves, and flushometer valves having controls, to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

E. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Include the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.

2. Remove sediment and debris from drains.

3.07 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities, except when approved in writing by Owner.

3.08 SCHEDULES

A. See Plumbing Fixture Matrix attached to this Section.

END OF SECTION 22 40 00

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END OF HVAC INDEX

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. HVAC Pipe and Pipe Fittings
2. Joining Materials
3. Dielectric Fittings
4. HVAC Sleeves
5. HVAC Sleeve Seals
6. HVAC Specialties
7. HVAC Piping System Installation
8. HVAC Equipment Installation
9. Concrete Bases.
10. Erection of Metal Supports
11. Erection of Wood Supports
12. Cutting and Patching

B. Related Sections:

1. Section 01 31 00 - Project Management and Coordination
2. Section 01 73 29 - Cutting and Patching
3. Section 01 78 43 - Spare Parts and Materials
4. Section 01 79 00 - Training
5. Section 01 78 23 - Operating and Maintenance Data
6. Section 03 30 00 - Cast-in-Place Concrete
7. Section 06 10 00 - Rough Carpentry
8. Section 07 62 00 - Sheet Metal Flashing and Trim
9. Section 07 84 00 - Firestopping
10. Section 08 31 00 - Access Doors
11. Section 09 90 00 - Painting
12. Section 23 05 53 – Identification for HVAC Piping and Equipment: Labeling and identifying HVAC systems and equipment.
13. Section 31 20 00 – Earth Moving

1.02 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.

2. CPVC: Chlorinated polyvinyl chloride plastic.

3. PVC: Polyvinyl chloride plastic.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections:

1. Product Data: For dielectric fittings, flexible connectors, plumbing sleeve seals, and identification materials and devices.

2. Coordination Drawings: Detail major elements, components, and systems of plumbing equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:

a. Planned piping layout, including valve and specialty locations and valve-stem movement.

b. Clearances for installing and maintaining insulation.

c. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.

d. Equipment and accessory service connections and support details.

e. Exterior wall and foundation penetrations.

f. Fire-rated wall and floor penetrations.

g. Sizes and location of required concrete pads and bases.

h. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.

i. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

1.04 QUALITY ASSURANCE

A. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting plumbing and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases.

1. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design requirements. See drawings for equipment schedules and requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.06 SEQUENCING AND SCHEDULING

A. Coordinate HVAC equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate connection of HVAC systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Section 08 31 13 - "Access Doors and Frames."

G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

1.07 Posted Operating Instructions

A. Provide and post operating instructions for all HVAC systems.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. HVAC Sleeve Seals:

a. None

B. Approved Manufacturers:

1. HVAC Sleeve Seals:

a. Metraflex Inc. (800-621-4347)

b. PSI-Thunderline/Link-Seal (800-423-2410)

2.02 HVAC PIPE AND PIPE FITTINGS

A. Refer to individual Division 23 piping Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.03 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

C. Solder Filler Metals: ASTM B32.

1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.

2. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.

3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10 percent maximum lead content.

4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10 percent maximum lead content.

5. Alloy Sb5: 95 percent tin and 5 percent antimony, with 0.20 percent maximum lead content.

D. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.

2. BAg1: Silver alloy.

3. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

E. Solvent Cements: Manufacturer's standard solvent cements for the following:

1. ABS Piping: ASTM D2235.

2. CPVC Piping: ASTM F493.

3. PVC Piping: ASTM D2564. Include primer according to ASTM F656.

4. PVC to ABS Piping Transition: ASTM D3138.

F. Plastic Pipe Seals: ASTM F477, elastomeric gasket.

G. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

H. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

1. Sleeve: ASTM A126, Class B, gray iron.

2. Followers: ASTM A47 malleable iron or ASTM A536 ductile iron.

3. Gaskets: Rubber.

4. Bolts and Nuts: AWWA C111.

5. Finish: Enamel paint.

2.04 HVAC SLEEVES

A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.

2. Steel Pipe: ASTM A53, Type E, Grade A, Schedule 40, galvanized, plain ends.

3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
    a. Underdeck Clamp: Clamping ring with set screws.

2.05 HVAC SLEEVE SEALS

A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.06 HVAC SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.
    1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
    2. OD: Completely cover opening.
    3. Cast Brass: Split casting, with concealed hinge and set screw.
        a. Finish: Polished chrome-plate.
    4. Cast-Iron Floor Plate: One-piece casting.

B. Grout:
    1. Non-shrink, Nonmetallic Grout: ASTM C1107, Grade B.
        a. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, non-staining, non-corrosive, nongaseous, and recommended for interior and exterior applications.
        b. Design Mix: 5000-psig, 28-day compressive strength.
        c. Packaging: Premixed and factory packaged.

PART 3 EXECUTION

3.01 HVAC PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install HVAC piping as described below, unless piping Sections specifies otherwise. Individual Division 23 Piping Sections specifies unique piping installation requirements.

B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings as required by Division 01 Sections and as outlined in Part 1 of this section.

C. Install piping at indicated slope.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

I. Install piping to allow application of insulation plus 1-inch clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve operation and servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's written instructions.

M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish.

2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw, and chrome-plated finish.

3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.

4. Insulated Piping: Cast brass with concealed hinge, set screws, and chrome-plated finish.

5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

N. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping rings where required.

2. Build sleeves into walls and slabs as work progresses.

3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS (DN150).

b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS (DN150) and larger, penetrating gypsum-board partitions.

4. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Section 07 62 00 "Sheet Metal Flashing and Trim" for flashing.

a. Seal space outside of sleeve fittings with non-shrink, nonmetallic grout.

5. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealant. Refer to Section 07 92 00 "Joint Sealants" for materials.

6. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

O. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.

2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.

3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

P. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire stopping materials. Refer to Section 07 84 00 - "Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

T. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

3. Soldered Joints: Construct joints according to CDA's "Copper Tube Handbook."

4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.

c. Align threads at point of assembly.

d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.

e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.

7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:

a. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.

b. CPVC Piping: ASTM D2846 and ASTM F493.

c. PVC Pressure Piping: ASTM D2672.

d. PVC Non-pressure Piping: ASTM D2855.

9. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657 procedures and manufacturer's written instructions.

    a. Plain-End Pipe and Fittings: Use butt fusion.

    b. Plain-End Pipe and Socket Fittings: Use socket fusion.

U. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.

2. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.02 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights is not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Owner’s Representative.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope as specified in other Division 23 sections.

F. Clearance from Electrical Equipment: Piping and ductwork are prohibited in electric rooms and closets, elevator machine rooms and installation over transformers, switchboards and motor control centers.

3.03 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psig 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 - "Cast-in-Place Concrete."

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

C. Prime and paint all metal supports per Section 09 90 00 requirements similar to “Pipes and Mechanical Equipment”.

3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor HVAC materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.06 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

C. Refer to Division 01 Sections for additional requirements.

3.07 GROUTING

A. Install nonmetallic, non-shrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placing of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases to provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION

SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Basic Motor Requirements
2. Polyphase Motors
3. Single Phase Motors

B. Related Sections:

1. Division 23 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.

1.03 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Listing and Labeling: Provide motors specified in this Section that are listed and labeled.

1. Terms "Listed and Labeled": As defined in the National Electrical Code, Article 100.

PART 2 PRODUCTS

2.01 BASIC MOTOR REQUIREMENTS

A. Basic requirements apply to mechanical equipment motors, unless otherwise indicated.

B. Motors 1/2 HP and Larger: Polyphase.

C. Motors Smaller than 1/2 HP: Single phase.

D. Frequency Rating: 60 Hz.

E. Voltage Rating: Determined by voltage of circuit to which motor is connected.

F. Service Factor: According to NEMA MG 1, general purpose continuous duty, design type “B.”

G. Capacity and Torque Characteristics: Rated for continuous duty and sufficient to start, accelerate, and operate connected loads at designated speeds, in indicated environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

H. Enclosure: Open drip-proof, unless otherwise indicated.

I. Efficiency: Motors shall have a higher efficiency rating than industry standard average motor as delineated in IEEE Standard 112, Test Method 13.

2.02 POLYPHASE MOTORS

A. Description: NEMA MG 1, medium induction motor.

1. Design Characteristics: NEMA MG 1, Design B, unless otherwise indicated.
2. Energy-Efficient Design: Where indicated.

3. Stator: Copper windings, unless otherwise indicated. Multi-speed motors have separate winding for each speed.
4. Rotor: Squirrel cage, unless otherwise indicated.
5. Bearings: Double-shielded, pre-lubricated ball bearings suitable for radial and thrust loading.
6. Temperature Rise: Match insulation rating, unless otherwise indicated.
7. Insulation: Class F, unless otherwise indicated.

B. Motors Used with Reduced-Inrush Controllers: Match wiring connection requirements for indicated controller, with required motor leads brought to motor terminal box to suit control method.

C. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Critical vibration frequencies are not within operating range of controller output.
2. Temperature Rise: Match rating for Class B insulation.
3. Insulation: Class H
4. Thermal Protection: Where indicated, conform to NEMA MG 1 requirements for thermally protected motors.

D. Source Quality Control: Perform the following routine tests according to NEMA MG 1:

1. Measurement of winding resistance.
2. No-load readings of current and speed at rated voltage and frequency.
3. Locked rotor current at rated frequency.
4. High-potential test.
5. Alignment

2.03 SINGLE-PHASE MOTORS

A. Type: As indicated or selected by manufacturer from one of the following, to suit starting torque and other requirements of specific motor application.

1. Permanent-split capacitor.
2. Split-phase start, capacitor run.
3. Capacitor start, capacitor run.

B. Shaded-Pole Motors: Do not use, unless motors are smaller than 1/20 hp.

C. Thermal Protection: Where indicated or required, internal protection automatically opens power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal protection device automatically resets when motor temperature returns to normal range, unless otherwise indicated.

D. Bearings: Ball-bearing type for belt-connected motors and other motors with high radial forces on motor shaft. Sealed, pre-lubricated sleeve bearings for other single-phase motors.

PART 3 EXECUTION

3.01 ADJUSTING

A. Use adjustable motor mounting bases for belt-driven motors.

B. Align pulleys and install belts.

C. Tension according to manufacturer's written instructions.

END OF SECTION

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Hangers And Supports For HVAC System Piping And Equipment.

B. Related Sections:

1. Section 05 50 00 (05500) - Metal Fabrications
2. Section 09 90 00 (09900) - Painting

1.02 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) with the following supporting data:

1. Product Data:

a. For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

1.04 QUALITY ASSURANCE

A. Engineering Responsibility: Where required by the local authority having jurisdiction design and preparation of Shop Drawings and calculations for each multiple pipe support, trapeze, and seismic restraint by a qualified professional engineer.

1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Pipe Hangers, Supports, and Components:

a. None

2. Channel Support Systems:

a. None

3. Thermal-Hanger Shield Inserts:

a. None

4. Powder-Actuated and Mechanical Anchor Fastener Systems:

a. None

B. Approved Manufacturers:

1. Pipe Hangers, Supports, and Components:
   a. Cooper B-Line, Inc. (618-654-2184)
   b. Grinnell Mechanical Products, A Tyco International Company (800-500-4768)
   c. National Pipe Hanger Corporation (609-261-5353)
2. Channel Support Systems:
   a. Cooper B-Line, Inc. (618-654-2184)
   b. Grinnell Mechanical Products, A Tyco International Company (800-500-4768)
   c. National Pipe Hanger Corporation (609-261-5353)
3. Thermal-Hanger Shield Inserts:
   a. Carpenter & Patterson, Inc. (301.333.4631)
   b. Erico (Michigan Hanger) (440-248-0100)
   c. PHS Industries, Inc. (800-626-2336)
4. Powder-Actuated and Mechanical Anchor Fastener Systems:
   a. Gunnebo Fastening Corp. (800-336-1640)
   b. Hilti, Inc.(800-879-8000)
   c. ITW Ramset/Red Head (800-899-7890)

2.02 HANGERS AND SUPPORTS

A. Pipe Hangers, Supports, and Components:
   1. MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
      a. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
      b. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

B. Channel Support Systems:
   1. MFMA-2, factory-fabricated components for field assembly.
   2. Coatings: Manufacturer's standard finish.
   3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

C. Thermal-Hanger Shield Inserts:
   1. 100-psi minimum compressive-strength insulation, encased in sheet metal shield.
   2. Material for Cold Piping: ASTM C552, Type I cellular glass.
   3. Material for Hot Piping: ASTM C552, Type I cellular glass.
   4. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
   5. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
   6. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.03 MISCELLANEOUS MATERIALS

A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

C. Structural Steel: ASTM A36, steel plates, shapes, and bars, black and galvanized.

D. Grout: ASTM C1107, Grade B, factory-mixed and -packaged, non-shrink and nonmetallic, dry, hydraulic-cement grout.

1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.

2. Properties: Nonstaining, noncorrosive, and nongaseous.

3. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 EXECUTION

3.01 HANGER AND SUPPORT APPLICATIONS

A. General:

1. Specific hanger requirements are specified in Sections specifying equipment and systems.

2. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

B. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.

2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24 if little or no insulation is required.

3. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 to allow off-center closure for hanger installation before pipe erection.

4. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

5. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

6. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.

7. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.

8. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

C. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).

D. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.

E. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.

2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

3. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

4. C-Clamps (MSS Type 23): For structural shapes.

5. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

a. Light (MSS Type 31): 750 lb.

b. Medium (MSS Type 32): 1500 lb.

F. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.

2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

3.02 HANGER AND SUPPORT INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.

1. Field assemble and install according to manufacturer's written instructions.

C. Install building attachments to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.

D. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

J. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits according to ASME B31.9.

2. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches long and 0.048 inch thick.

b. NPS 4 (DN100): 12 inches long and 0.06 inch thick.

5. Insert Material: Length at least as long as protective shield.

3.03 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Prime and Paint Equipment Supports as specified in Section 09 90 00 “Painting”.

3.04 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.05 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments to level equipment and to achieve indicated slope of pipe.

3.06 PAINTING

A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 09 90 00 “Painting”.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION

SECTION 23 05 48

VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Vibration Isolators.
2. Seismic Controls.
3. Vibration Isolation Bases.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 04 20 00 - Unit Masonry
3. Section 05 12 00 - Structural Steel
4. Section 06 10 00 - Rough Carpentry
5. Section 09 90 00 - Painting
6. Section 23 05 00 - Common Work Results for HVAC
7. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: for pipe hanger restraints.
8. Section 23 31 13 - Metal Ducts: for flexible duct connectors.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data: Indicate types, styles, materials, and finishes for each type of isolator specified. Include load deflection curves.
2. Shop Drawings: Show designs and calculations, certified by a professional engineer, as required by the local authority, for the following:
   a. Design Calculations: Calculations for selection of vibration isolators, design of vibration isolation bases, and selection of seismic restraints.
   b. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to the structure and to the supported equipment. Include auxiliary motor slides and rails, and base weights.
   c. Seismic Restraint Details: Detail fabrication and attachment of restraints and snubbers.

1.03 PROJECT CONDITIONS

A. Project seismic zone is 1 with a zone factor of 0.075.

B. Building Importance Factor: 1.3.

1.04 COORDINATION

A. Coordinate layout and installation of vibration isolation and seismic-restraint devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

B. Coordinate size and location of concrete housekeeping and vibration isolation bases. Cast anchor-bolt inserts into base. Concrete, reinforcement, and formwork requirements are specified in Division 03 Sections.

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Sections.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Cooper B-Line Systems, Inc. (800-851-7415)
2. Kinetics Noise Control, Inc. (877-457-2695)
3. Mason Industries, Inc. (631-348-0282)

2.02 VIBRATION ISOLATORS

A. Rubber Isolator Mounts: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements, with encapsulated top- and baseplates. Factory-drilled and tapped top plate for bolted equipment mounting. Factory-drilled baseplate for bolted connection to structure. Color-code to indicate capacity range.

B. Spring Isolators: Freestanding, laterally stable, open-spring-type isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 1.2 times the rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to a 1/4-inch- thick, rubber isolator pad attached to the baseplate underside. Size baseplates to limit floor loading to 100 psig.
6. Top Plates: Provide threaded studs for fastening and leveling equipment.
7. Finishes: Manufacturer's standard corrosive-resistant finish.

C. Restrained Spring Isolators: Vertically restrained, freestanding, laterally stable, steel open-spring-type isolators.

1. Housing: Welded steel with resilient vertical limit stops to prevent spring extension due to wind loads or when weight is removed. Factory-drilled baseplate for bolting to structure and bonded to a 1/4-inch thick, rubber isolator pad attached to the baseplate underside. Provide adjustable equipment mounting and leveling bolt.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 0.8 times the rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Finishes: Baked enamel for metal components on isolators for interior use. Hot-dip galvanized for metal components on isolators for exterior use.

D. Rubber Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to formed-steel housings with threaded connections for hanger rods. Color-code to indicate capacity range.

E. Spring Hangers: Combination spring and elastomeric hanger with coil spring and elastomeric insert in compression.

1. Frame: Formed steel, fabricated for connection to threaded rods and to allow for 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

3. Minimum Additional Travel: 50 percent of the required deflection at rated load.

4. Elastomeric Element: Molded, oil-resistant rubber or neoprene.

5. Finishes: Baked enamel for metal components. Color-code to indicate capacity range.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install and anchor vibration-control products according to manufacturer's written instructions and authorities having jurisdiction.

B. Anchor interior mounts, isolators, hangers, and snubbers to vibration isolation bases. Bolt isolator baseplates to structural floors as required by authorities having jurisdiction.

C. Anchor exterior mounts, isolators, hangers, and snubbers to vibration isolation bases. Bolt isolator baseplates to structural supports as required by authorities having jurisdiction.

D. Install pipe connectors at connections for equipment supported on vibration isolators.

3.02 ADJUSTING AND CLEANING

A. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operations.

B. Adjust thrust restraints for a maximum of 1/4 inch of movement at start and stop

END OF SECTION 23 05 48

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Identifying Devices and Labels

B. Related Sections:

1. Section 23 05 00 (15050) – Common Work Results for HVAC

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For identification materials and devices.

2. Samples: Of color, lettering style, and graphic representation required for each identification material and device.

1.03 QUALITY ASSURANCE

A. Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.

1.04 SEQUENCING AND SCHEDULING

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 GENERAL

A. General: Products specified are for applications referenced in other Division 23 Sections. If more than single type is specified for listed applications, selection is Installer's option.

B. Pipes Including Insulation: Full-band pipe markers, extending 360 degrees around pipe at each location.

2.02 IDENTIFYING DEVICES AND LABELS

A. Lettering: Manufacturer's standard preprinted captions as selected by Owner's Representative.

B. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.

1. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.

C. Plastic Duct Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cold-air supply.

2. Yellow: Hot-air supply.

3. Blue: Exhaust, outside, return, and mixed air.

4. Terminology: Include direction of airflow; duct service such as supply, return, and exhaust; duct origin, duct destination, and design flow.

D. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils thick.

1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.

2. Color: Comply with ASME A13.1, unless otherwise indicated.

E. Access Panel Markers: 1/16-inch thick, engraved plastic-laminate markers, with abbreviated terms and numbers corresponding to concealed valve. Provide 1/8-inch center hole for attachment.

F. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

PART 3 EXECUTION

3.01 LABELING AND IDENTIFYING PIPING SYSTEMS

A. Install pipe markers on each system as indicated below. Include arrows showing normal direction of flow.

1. Condensate.

2. Refrigerant

B. Marker Type: Plastic markers, with application systems. Install on pipe insulation segment where required for hot, noninsulated pipes.

C. Fasten markers on pipes and insulated pipes by one of following methods:

1. Snap-on application of pretensioned, semirigid plastic pipe marker.

D. Locate pipe markers where piping is exposed in machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations according to the following:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.

3. Near penetrations through walls, floors, ceilings, or nonaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. Spaced at a maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.02 LABELING AND IDENTIFYING DUCT SYSTEMS.

A. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows showing service and direction of flow.

1. Location: Locate signs near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.03 ADJUSTING AND CLEANING

A. Relocate HVAC identification materials and devices that have become visually blocked by work of this or other Divisions.

B. Clean faces of identification devices and glass frames of valve charts

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Balancing airflow within distribution systems, including sub-mains, branches, and terminals, to indicated quantities according to specified tolerances.
2. Adjusting total HVAC systems to provide indicated quantities.
3. Measuring electrical performance of HVAC and plumbing equipment.
4. Setting quantitative performance of HVAC and plumbing equipment.
5. Verifying that automatic control devices are functioning properly.
6. Reporting results of the activities and procedures specified in this Section.
7. Adjustment of recirculating domestic hot water return system.
8. Verify performance of package terminal air conditioning units.

B. Related Sections:

1. Testing and adjusting requirements unique to particular systems and equipment are included in the Sections that specify those systems and equipment.
2. Field quality-control testing to verify that workmanship quality for system and equipment installation is specified in system and equipment Sections.

1.02 REFERENCES

A. Associated Air Balance Council (AABC): "National Standards for Testing, Adjusting and Balancing"

B. Air Movement & Control Association International, Inc. (AMCA): 201, "Fans and Systems

C. National Environmental Balancing Bureau (NEBB): “Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems”

D. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "HVAC Systems--Duct Design"

1.03 DEFINITIONS

A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

B. Balance: To proportion flows within the distribution system, including sub-mains, branches, and terminals, according to design quantities.

C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.

D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

E. Report Forms: Test data sheets for recording test data in logical order.

F. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

G. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

H. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

I. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.

J. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

K. Test: A procedure to determine quantitative performance of a system or equipment.

L. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.

1.04 SUBMITTALS

A. Quality-Assurance Submittals: Within 30 days from the Contractor's Notice to Proceed, submit 2 copies of evidence that the testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.

B. Contract Documents Examination Report: Within 45 days from the Contractor's Notice to Proceed, submit 2 copies of the Contract Documents Review Report as specified in Part 3 of this Section.

C. Submittals Examination Report: Prior to the start of duct or piping fabrication, submit 2 copies of the Submitted Examination Report as specified in Part 3 of this Section.

D. Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.

1.05 QUALITY ASSURANCE

A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by either AABC or NEBB.

B. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:

1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.

2. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.

C. Testing, Adjusting, and Balancing Reports: Use testing, adjusting, and balancing standard forms from AABC's "National Standards for Testing, Adjusting and Balancing" or NEBB's "Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems".

D. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

E. Testing, Adjusting, and Balancing Conference: Meet with the Owner's representatives on approval of the testing, adjusting, and balancing strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of testing, adjusting, and balancing team members, equipment manufacturers' authorized service representatives, HVAC controls Installer, and other support personnel. Provide 7 days advance notice of scheduled meeting time and location. As a minimum include the following agenda items:

1. Submittal distribution requirements.

2. Contract Documents examination report.

3. Testing, adjusting, and balancing plan.
4. Work schedule and Project site access requirements.
5. Coordination and cooperation of trades and subcontractors.

1.06 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.

C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine Contract Documents to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment and submit “Contract Documents Examination Report”.

1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
3. Examine Engineer’s design data, including HVAC and Plumbing system descriptions, statements of design assumptions for environmental conditions and systems’ output, and statements of philosophies and assumptions about HVAC and Plumbing systems and equipment controls.

B. Examine approved submittal data of HVAC and Plumbing systems and equipment including sheet metal duct fabrication and plumbing piping shop drawings to ensure that the distribution system is reasonably complete and sufficiently designed to accurately balance the complete building. Submit “Submitting Examination Report”.

1. Examine equipment performance data, including fan and pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 07 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 05 and 06. Compare this data with the design data and installed conditions.

C. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.

1. Examine HVAC and Plumbing systems and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly

installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

2. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
3. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
4. Examine terminal units to verify that they are accessible and their controls are connected and functioning.
5. Examine plenum ceilings, utilized for return air, to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.
6. Examine heat-transfer coils for clean and straight fins.
7. Examine equipment for installation and for properly operating safety interlocks and controls.
8. Examine automatic temperature system components to verify the following:
    a. Dampers, and other controlled devices operate by the intended controller.
    b. Dampers are in the position indicated by the controller.
    c. Integrity dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in variable-air-volume terminals.
    d. Thermostats are located to avoid adverse effects of sunlight, drafts, and cold walls.
    e. Sensors are located to sense only the intended conditions.
    f. Sequence of operation for control modes is according to the Contract Documents.
    g. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
    h. Interlocked systems are operating.
    i. Changeover from heating to cooling mode occurs according to design values.

D. Examine project record documents described in Section 01 78 39 (01785) - “Project Record Documents”.

E. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

3.02 PREPARATION

A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Permanent electrical power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are properly located, sized, and securely closed.
4. Verify that smoke and fire dampers are open.
5. Isolating and balancing valves are open and control valves are operational.
6. Access to balancing devices is provided.

7. Windows and doors can be closed so design conditions for system operations can be met.

3.03 GENERAL TESTING AND BALANCING PROCEDURES

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section or in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

B. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, balancing, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

C. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project. Plastic plugs with retainers may be used to patch drilled holes in ductwork and housings.

3.04 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic single line diagrams of systems' "as-built" duct layouts and domestic hot water distribution.

C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.

D. Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check dampers for proper position to achieve desired airflow path.

H. Check for airflow blockages.

I. Check condensate drains for proper connections and functioning.

J. Check for proper sealing of air-handling unit components.

3.05 CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES

A. The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems.

B. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.

1. Measure fan static pressures to determine actual static pressure as follows:

a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.

b. Measure static pressure directly at the fan outlet or through the flexible connection.

c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.

d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

2. Measure static pressure across each air-handling unit component.

    a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.

3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers under final balanced conditions.

4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.

5. Adjust fan speed higher or lower than design with the approval of the Owner's Representative. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.

6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.

C. Adjust volume dampers for main duct, sub-main ducts, and major branch ducts to design airflows within specified tolerances.

1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.

    a. Where sufficient space in sub-mains and branch ducts is unavailable for Pilot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Re-measure each sub-main and branch duct after all have been adjusted. Continue to adjust sub-mains and branch ducts to design airflows within specified tolerances.

D. Measure terminal outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.

E. Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.

1. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.

2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.06 MOTORS

A. Motors: Test at final balanced conditions and record the following data:

1. Manufacturer, model, and serial numbers.

2. Motor horsepower rating.

3. Motor RPM.

4. Efficiency rating if high-efficiency motor.

5. Nameplate and measured voltage, each phase.

6. Nameplate and measured amperage, each phase.

7. Starter thermal-protection-element rating.

3.07 CONDENSING UNITS

A. Verify proper rotation of fans and measure entering- and leaving-air temperatures. Record compressor data.

3.08 HEAT-TRANSFER COILS

A. Electric-Heating Coils: Measure the following data for each coil:

1. Nameplate data.
2. Airflow.
3. Entering- and leaving-air temperatures at full load.
4. Voltage and amperage input of each phase at full load and at each incremental stage.
5. Calculated kW at full load.
6. Fuse or circuit-breaker rating for overload protection.

3.09 TEMPERATURE TESTING

A. During testing, adjusting, and balancing, report need for adjustment in temperature regulation within the automatic temperature-control system.

B. Measure indoor and outdoor wet- and dry-bulb temperatures every other hour for a period of 2 successive 8-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

3.10 TEMPERATURE-CONTROL VERIFICATION

A. Verify that controllers are calibrated and commissioned.

B. Check transmitter and controller locations and note conditions that would adversely affect control functions.

C. Record controller settings and note variances between set points and actual measurements.

D. Verify operation of limiting controllers (i.e., high- and low-temperature controllers).

E. Verify free travel and proper operation of control devices such as damper and valve operators.

F. Confirm interaction of electrically operated switch transducers.

G. Confirm interaction of interlock and lockout systems.

H. Verify main control supply-air pressure and observe compressor and dryer operations.

I. Record voltages of power supply and controller output. Determine if the system operates on a grounded or non-grounded power supply.

J. Note operation of electric actuators using spring return for proper fail-safe operations.

3.11 TOLERANCES

A. Set HVAC system airflow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans: Plus 5 to plus 10 percent.
2. Air Outlets and Inlets: 0 to minus 10 percent.

B. Set plumbing system water flow rates within the following tolerances:

1. Domestic Hot Water Recirculation Flow Rate: 0 to minus 10 percent.

3.12 FINAL REPORT

A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.

B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.

1. Include a list of the instruments used for procedures, along with proof of calibration.

C. Final Report Contents: In addition to the certified field report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.

D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:

1. Title page.
2. Name and address of testing, adjusting, and balancing Agent.
3. Project name.
4. Project location.
5. Owner’s name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of testing, adjusting, and balancing Agent who certifies the report.
10. Summary of contents, including the following:
    a. Design versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.
11. Nomenclature sheets for each item of equipment.
12. Data for terminal units, including manufacturer, type size, and fittings.
13. Notes to explain why certain final data in the body of reports vary from design values.
14. Test conditions for fans and pump performance forms, including the following:
    a. Settings for outside-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Other system operating conditions that affect performance.

E. System Diagrams: Include schematic layouts of air distribution systems and domestic hot water distribution systems. Present with single-line diagrams and include the following:

1. Quantities of outside, supply, return, and exhaust airflows.
2. Duct, outlet, and inlet sizes.
3. Location of manual volume control dampers.

4. Water flow meter.
5. Balancing valve sizes/locations.

F. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data: Include the following:
   a. System identification.
   b. Location.
   c. Make and type.
   d. Model number and size.
   e. Manufacturer's serial number.
   f. Arrangement and class.
   g. Sheave make, size in inches and bore.
   h. Sheave dimensions, center-to-center and amount of adjustments in inches.
2. Motor Data: Include the following:
   a. Make and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Sheave make, size in inches and bore.
   f. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).
   g. Number of belts, make, and size.
3. Test Data: Include design and actual values for the following:
   a. Total airflow rate in cfm.
   b. Total system static pressure in inches wg.
   c. Fan rpm.
   d. Discharge static pressure in inches wg.
   e. Suction static pressure in inches wg

G. Air Handling Test Reports.

H. Gas-Fired Heat Apparatus Test Reports; i.e., unit heaters, duct furnaces, domestic water heaters.

I. Electric Coil Test Reports; i.e., electric baseboards, electric unit heaters, electric cabinet heaters.

J. Duct Traverse Reports.

K. Air Terminal Device Reports; i.e., diffusers/registers/grilles.

L. Pool Dehumidification Test Reports.

M. Package Terminal Air Conditioning Test Reports; including equipment leveling to ensure condensate is pitched to building exterior.

N. Plumbing Pump Test Reports including recirculating hot water and sump pumps.

O. Instrument Calibration Reports.

3.13 ADDITIONAL TESTS

A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

END OF SECTION

SECTION 23 07 00 - HVAC INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Insulation Materials
2. Jackets
3. Accessories and Attachments
4. Vapor Retarders

B. Related Sections:

1. Section 07 84 00 (07840) - Firestopping: Firestopping materials and requirements for penetrations through fire and smoke barriers.
2. Section 22 07 00 (15083) - Plumbing Insulation
3. Section 23 31 13 (15815) - Metal Ducts: For duct liner.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:
   a. Identify thermal conductivity, thickness, and jackets (both factory and field applied) for each type of product indicated.
2. Shop Drawings:
   a. Submit manufacturer’s data for each type of insulation used.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or similar industry recognized craft training program.

B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.05 COORDINATION

A. Coordinate clearance requirements with duct Installer for insulation application.

1.06 SCHEDULING

A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Mineral-Fiber Insulation:
   a. None
2. Mineral-Fiber Blanket Thermal Insulation:
   a. None
3. Closed-Cell Phenolic-Foam Insulation:
   a. None
4. Flexible Elastomeric Thermal Insulation:
   a. None

B. Approved Manufacturers:

1. Mineral-Fiber Insulation:
   a. CertainTeed Corp. (610-647-3011)
   b. Knauf Insulation. (800-825-4434)
   c. Owens-Corning Fiberglas Corp. (800-447-3759)
2. Mineral-Fiber Blanket Thermal Insulation:
   a. CertainTeed Corp. (610-647-3011)
   b. Knauf Insulation. (800-825-4434)
   c. Owens-Corning Fiberglas Corp. (800-447-3759)
3. Closed-Cell Phenolic-Foam Insulation:
   a. "Kooltherm Pipe Insulation"; Kingspan Insulation Ltd. (904-486-0553).
4. Flexible Elastomeric Thermal Insulation:
   a. Armstrong World Industries (800-448-1405)
   b. Rubatex International LLC (800-782-2839)

2.02 INSULATION MATERIALS

A. Mineral-Fiber Board Thermal Insulation:

1. Glass fibers bonded with a thermosetting resin. Comply with ASTM C612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

B. Mineral-Fiber Blanket Thermal Insulation:

1. Glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

C. Closed-Cell Phenolic-Foam Insulation:

1. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C1126, Type II, Grade 1.

D. Flexible Elastomeric Thermal Insulation:

1. Closed-cell, sponge or expanded-rubber materials.

2. Comply with ASTM C534, Type I for tubular materials and Type II for sheet materials
   a. Adhesive: As recommended by insulation manufacturer.
   b. Ultraviolet Protective Coating: As recommended by insulation manufacturer.

2.03 FIELD-APPLIED JACKETS

A. General: ASTM C921, Type 1, unless otherwise indicated.

B. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

2.04 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd.
   1. Tape Width: 4 inches.

B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
   1. Stainless Steel: ASTM A666, Type 304; 0.020 inch thick.
   2. Galvanized Steel: 0.005 inch thick.
   3. Aluminum: 0.007 inch thick.
   4. Brass: 0.010 inch thick.
   5. Nickel-Copper Alloy: 0.005 inch thick.

C. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.

D. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.
   1. Welded Pin Holding Capacity: 100 lb for direct pull perpendicular to the attached surface.

E. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.
   1. Adhesive: Recommended by the anchor pin manufacturer as appropriate for surface temperatures of ducts, plenums, and breechings; and to achieve a holding capacity of 100 lb for direct pull perpendicular to the adhered surface.

F. Self-Adhesive Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

2.05 VAPOR RETARDERS

A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.03 GENERAL APPLICATION REQUIREMENTS

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.

B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Apply multiple layers of insulation with longitudinal and end seams staggered.

E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

F. Keep insulation materials dry during application and finishing.

G. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

H. Apply insulation with the least number of joints practical.

I. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

J. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.

K. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

L. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.

2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.

3. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.

M. Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.

N. Install vapor-retarder mastic on ducts and plenums scheduled to receive vapor retarders.

1. Ducts with Vapor Retarders: Overlap insulation facing at seams and seal with vapor-retarder mastic and pressure-sensitive tape having same facing as insulation. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-retarder seal.

2. Ducts without Vapor Retarders: Overlap insulation facing at seams and secure with outward clinching staples and pressure-sensitive tape having same facing as insulation.

O. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.

1. Seal penetrations with vapor-retarder mastic.

2. Apply insulation for exterior applications tightly joined to interior insulation ends.

3. Seal insulation to roof flashing with vapor-retarder mastic.

P. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

Q. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.

R. Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor.

1. For insulation indicated to have vapor retarders, taper termination and seal insulation ends with vapor-retarder mastic.

3.04 MINERAL-FIBER INSULATION APPLICATION

A. Blanket Applications for Ducts and Plenums: Secure blanket insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives according to manufacturer's recommended coverage rates per square foot, for 100 percent coverage of duct and plenum surfaces.

2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.

3. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

a. On duct sides with dimensions 18 inches and smaller, along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.

b. On duct sides with dimensions larger than 18 inches. Space 16 inches o.c. each way, and 3 inches maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.

c. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.

d. Do not overcompress insulation during installation.

4. Impale insulation over anchors and attach speed washers.

5. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

6. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch staples, 1 inch o.c., and cover with pressure-sensitive tape having same facing as insulation.

7. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. Secure with steel band at end joints and spaced a maximum of 18 inches o.c.

8. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

9. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches o.c.

10. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

B. Board Applications for Ducts and Plenums: Secure board insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives according to manufacturer's recommended coverage rates per square foot, for 100 percent coverage of duct and plenum surfaces.

2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.

3. Space anchor pins as follows:

a. On duct sides with dimensions 18 inches and smaller, along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.

b. On duct sides with dimensions larger than 18 inches. Space 16 inches o.c. each way, and 3 inches maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.

c. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.

d. Do not overcompress insulation during installation.

4. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

5. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch staples, 1 inch o.c., and cover with pressure-sensitive tape having same facing as insulation.

6. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

7. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches o.c.

8. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

3.05 CLOSED-CELL PHENOLIC-FOAM INSULATION APPLICATION

A. Apply insulation as follows:

1. Secure each layer of insulation to duct with stainless-steel bands at 12-inch intervals and tighten without deforming the insulation materials.

2. Apply two-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with 0.062-inch, soft-annealed, stainless-steel wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.

3. On exposed applications, finish insulation with a skim coat of mineral-fiber, hydraulic-setting cement to surface of installed insulation. When dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth or tape. Thin the finish coat to achieve smooth finish.

3.06 FLEXIBLE ELASTOMERIC THERMAL INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Follow manufacturer’s written instructions for applying insulation.

2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

B. Apply insulation to flanges as follows:

1. Apply pipe insulation to outer diameter of pipe flange.

2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of the same thickness as pipe insulation.

4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

C. Apply insulation to fittings and elbows as follows:

1. Apply mitered sections of pipe insulation.

2. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

D. Apply insulation to valves and specialties as follows:

1. Apply preformed valve covers manufactured of the same material as pipe insulation and attached according to the manufacturer's written instructions.

2. Apply cut segments of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, fabricate removable sections of insulation arranged to allow access to strainer basket.

3. Apply insulation to flanges as specified for flange insulation application.

4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3.07 FIELD-APPLIED JACKET APPLICATION

A. Apply glass-cloth jacket, where indicated, directly over bare insulation or insulation with factory-applied jackets.

1. Apply jacket smooth and tight to surface with 2-inch overlap at seams and joints.

2. Embed glass cloth between two 0.062-inch thick coats of jacket manufacturer's recommended adhesive.

3. Completely encapsulate insulation with jacket, leaving no exposed raw insulation.

3.08 DUCT SYSTEM APPLICATIONS

A. Insulation materials and thicknesses are specified in schedules at the end of this Section.

B. Materials and thicknesses for systems listed below are specified in schedules at the end of this Section.

C. Insulate the following plenums and duct systems:

1. Indoor concealed supply-, return-, and outside-air ductwork.

D. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:

1. Indoor exposed metal ducts, unless noted otherwise.
2. Metal ducts with duct liner, unless noted otherwise.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections, unless noted otherwise.
5. Flexible connectors.
6. Vibration-control devices.
7. Testing agency labels and stamps.
8. Nameplates and data plates.
9. Access panels and doors in air-distribution systems.

3.09 INDOOR DUCT AND PLENUM APPLICATION SCHEDULE

	Service	Material	Thickness	Number of Layers	R-Value (Min. Installed)	Vapor Retarder Required
A.	Round and rectangular, supply-air ducts, concealed	Mineral-fiber blanket	1-1/2”	One	4.2	Yes
B.	Round and rectangular, return-air ducts, concealed	Mineral-fiber blanket	1-1/2”	One	4.2	Yes
C.	Round and rectangular, outside-air ducts, concealed	Mineral-fiber blanket	2”	One	4.2	Yes
D.	Round and rectangular, supply-air ducts, exposed	None required, unless noted otherwise				
E.	Round and rectangular, return-air ducts, exposed	None required, unless noted otherwise				
F.	Round and rectangular, outside-air ducts, exposed	Mineral-fiber blanket	1-1/2”	One	4.2	Yes

3.10 OUTDOOR DUCT AND PLENUM APPLICATION SCHEDULE

Note: Verify insulation thicknesses below based on guidelines from ASHRAE and local code requirements.

	Service	Material	Thickness	Number of Layers	Field Applied Jacket
A.	Round air ducts	Closed-cell phenolic foam	2”	One	PVC
B.	Rectangular air ducts	Closed-cell phenolic foam	2”	One	PVC

3.11 ATTIC DUCT AND PLENUM APPLICATION SCHEDULE

	Service	Material	Thickness	Number of Layers
A.	Round and rectangular, supply-air, return-air, and outside-air ducts	Mineral fiber blanket	3”	One

3.12 PIPING SYSTEM APPLICATION SCHEDULE

	Service	Material	Thickness	Field Applied Jacket	Finish
A.	Refrigerant section, liquid and hot-gas piping (where required). Operating Temperature: 35 to 50 deg. F.	Flexible elastomeric	Copper Piping ALL sizes: 1”	None	None

3.13 EXTERIOR PIPE INSULATION APPLICATION SCHEDULE

A. This application schedule is for above ground insulation outside the building. Loose-fill insulation, for below ground piping, is specified in Division 33 piping distribution Sections.

	Service	Material	Thickness	Field Applied Jacket	Vapor Retarder Required	Finish
A.	Above ground insulation outside the building Operating Temperature: 35 to 50 deg. F.	Flexible elastomeric	Copper Piping ALL sizes: 1/2”	None.	Yes	Two coats of manufacturer’s recommended UV inhibitor

END OF SECTION

SECTION 23 08 01 - COMMISSIONING OF HVAC

PART 1 – GENERAL

1.01 Description

A. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.

B. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the contract documents the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing Contractors/Sub-Contractors.

2. Verify and document proper performance of equipment and systems.

3. Verify that O&M documentation left on site is complete.

4. Verify that the Owner's operating personnel are trained.

C. The commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractors/Sub-Contractors to provide a finished and fully functioning product.

1.02 Coordination

A. Commissioning Team. The members of the commissioning team consist of the Commissioning Authority (CxA), the Owner's Project Manager (PM), the Construction Manager (CM) the design Architects/Engineers (A/E), the Mechanical Contractors/Sub-Contractors (MC), the Testing, Adjusting and Balancing Contractor (TAB), the Controls Contractor (ATC), any other installing subcontractors or suppliers of equipment.

B. Management. The CxA directs and coordinates the commissioning activities and is part of the commissioning team. Prater Engineering Associates shall be the CxA for this project. The CxA is responsible to the Owner and shall have the authority to grant final acceptance of each system commissioned. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents. Refer to Para. 1.05 for additional management details.

C. Scheduling. The CxA shall work with the CM according to established protocols to schedule the commissioning activities. The CxA shall provide sufficient notice to the CM for scheduling commissioning activities. The CM shall integrate all commissioning activities into the master schedule. All parties shall address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

The CM shall provide the initial schedule of primary commissioning events at the commissioning scoping meeting. As construction progresses more detailed schedules are developed by the CxA. The Commissioning Plan also provides a format for detailed schedules.

1.03 Commissioning Process

A. Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.

1. Commissioning during construction begins with a scope meeting conducted by the CxA where the commissioning process is reviewed with the commissioning team members.

2. Additional meetings shall be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.

3. Equipment documentation is submitted to the CxA during normal submittals, including detailed startup procedures.

4. The CxA works with the Contractors/Sub-Contractors in developing startup plans and startup documentation formats, including providing the Contractors/Sub-Contractors with construction and startup checklists to be completed, during the startup process.

5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with construction and startup checklists being completed before functional testing.

6. The Contractors/Sub-Contractors, under their own direction, execute and document the construction and startup checklists. The CxA documents that the checklists were completed according to the contract documents. This may include the CxA witnessing startup of selected equipment. The CxA shall be notified 48 hours in advance of starting up equipment. Where applicable, manufacturers representative executes and documents startup of equipment.

7. The CxA develops specific equipment and system functional performance test procedures. The Contractors/Sub-Contractors review the procedures.

8. The procedures are executed by the Contractors/Sub-Contractors, under the direction of, and documented by the CxA.

9. Items of non-compliance in material, installation or setup are corrected at the Contractors/Sub-Contractors' expense and the system retested in accordance with paragraphs 3.05 of this section.

10. The CxA reviews the O&M documentation for completeness.

11. Commissioning is completed before Substantial Completion is achieved.

12. The CxA reviews, pre-approves and coordinates the training provided by the Contractors/Sub-Contractors and verifies that is was completed. The CxA shall attend 2 training sessions.

13. Deferred testing is conducted, as specified or required.

1.04 Related Work

A. Drawings and general requirements of the Contract, including General Conditions and Requirements, Supplementary Conditions, Revisions and other Specification sections, apply to work in this section.

B. See section 018113, “Sustainability Requirements” for items related to LEED Certification and targeted level of LEED for this project.

C. See section 019100, “Commissioning” for additional commissioning requirements.

1.05 Responsibilities

A. The responsibilities of various parties in the commissioning process are provided in this section. The responsibilities of the mechanical contractor, TAB and ATC Contractors are in Division 23. The responsibility of the (other) contractors are noted in their specification documents. It is noted that the services for the HVAC mechanical, plumbing and electrical designers/engineers, and Commissioning authority are not provided for in this contract. That is, the Contractor is not responsible for providing their services. Their responsibilities are listed here to clarify the commissioning process.

B. All Parties

1. Attend commissioning scoping meeting and additional meetings, as scheduled.

C. Mechanical and Electrical Designers/Engineers (A/E)

1. Perform normal submittal review, construction observation, as-built drawing preparation, records, etc., as contracted.

2. Provide any design narrative and sequences documentation requested by the CxA. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

3. Attend commissioning scoping meetings and other selected commissioning team meetings, as requested.

4. Participate in the resolution of system deficiencies identified during commissioning, according to the contract documents.

5. Review and approve the O&M manuals.

6. Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning including warranty-period commissioning.

D. Commissioning Authority (CxA)

1. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CxA may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the CM and the A/E. The primary role of the CxA is to develop and coordinate the execution of a testing plan, observe and document performance—that systems are functioning in accordance with the Contract Documents. The Contractors/Sub-Contractors shall provide all tools or the use of tools to start, checkout and functionally test equipment and systems.

2. Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.

3. Coordinate the commissioning work and, with the CM, ensure that commissioning activities are being scheduled into the master schedule.

4. Plan and conduct a commissioning scoping meeting and other commissioning meetings.

5. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor startup and checkout procedures.

6. Before startup, gather and review the current control sequences and interlocks and work with Contractors/Sub-Contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.

7. Concurrent with the A/E reviews, the CxA shall review normal Contractors/Sub-Contractors submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. The CxA shall notify the CM, PM or A/E as requested, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.

8. Write and distribute construction startup checklists.

9. Review factory startup plan and develop a startup plan and initial systems checkout plan with Contractors/Sub-Contractors.

10. Perform site visits, as necessary, to observe component and system installations. Attends selected progress meetings and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.

11. Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Include the testing report

and cleaning procedures documentation in O&M manuals. Notify owner's representative of any deficiencies in results or procedures.

12. Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Include the testing report and cleaning procedures documentation in O&M manuals. Notify owner's representative of any deficiencies in results or procedures.

13. Review and approve construction and startup checklists completion in conjunction with selected site observation and spot checking.

14. Review TAB execution plan.

15. Oversee sufficient startup and initial testing of the control system and verify it is ready to be used for TAB, before TAB is executed.

16. Review air and water systems balancing by spot testing, by reviewing completed reports and by selected site observation.

17. After TAB is complete and with necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. This may include direct digital control system trending, stand-alone datalogger monitoring or manual functional testing.

18. Analyze up to 3 functional performance trend logs and monitoring data to verify performance.

19. Maintain a master deficiency and resolution log and a separate testing record. Provide the PM with written progress reports and test results with recommended actions.

20. Review equipment warranties to ensure that the Owner's responsibilities are clearly defined.

21. Oversee and coordinate the training of the Owner's operating personnel attending sessions.

22. Compile and maintain a commissioning record.

23. Review of the final O&M manuals.

24. Provide a final commissioning report (as described in this section).

25. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.

E. Owner's Project Manager (PM)

1. Manage the contract of the A/E and of the CM.

2. Arrange the opportunity for facility operating and maintenance personnel to attend various field commissioning activities and field training.

3. Identify any possible warranty items, document and contact the Contractors for follow-up.

4. Ensure that any seasonal or deferred testing and any deficiency issues are identified.

F. Construction Manager (CM) / General Contractor (GC)

1. Facilitate the coordination of the commissioning work by the CxA. The CM and CxA ensure that commissioning activities are being scheduled into the master schedule.

2. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CxA.

3. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.

4. Ensure that all Contractors/Sub-Contractors execute their commissioning responsibilities according to the Contract Documents and schedule.

5. Perform the normal review of Contractors/Sub-Contractors submittals.

6. A representative shall attend a commissioning scope meeting and other necessary meetings scheduled by the CxA to facilitate the Commissioning process.

7. When necessary, observe and witness construction, construction and startup checklists, startup, and functional testing of selected equipment.

8. Review commissioning progress and deficiency reports.

9. Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning.

10. Coordinate the training of owner personnel.

11. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.

G. Contractors/Sub-Contractors

1. Coordinate the commissioning work with the CxA.

2. Execute their commissioning responsibilities according to the Contact Documents and schedule.

3. Attend the commissioning scope meeting(s) and other necessary meetings scheduled by the CxA to facilitate the Cmx process.

4. When necessary, observe and witness construction, construction and startup checklists, startup, and functional testing of selected equipment.

5. Review commissioning progress and deficiency reports.

6. Resolve the non-compliance and design deficiencies identified in all phases of commissioning.

7. Coordinate the training of Owner personnel for the systems provided under this contract.

8. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.

H. Equipment Suppliers

1. Provide all requested submittal data, including detailed startup procedures and specific responsibilities of the Owner to keep warranties in force.

2. Assist in equipment testing per agreements with Contractors/Sub-Contractors.

3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractors/Sub-Contractors.

4. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

5. Review test procedures for equipment started up by factory representatives.

1.06 Definitions

1. Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occur.

2. Approval - acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.

3. Architect / Engineer (A/E) - the prime consultant and sub-consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.

4. Commissioning Authority (CxA) - an agent, not otherwise responsible for the design or the construction. The CxA directs and coordinates the day-to-day commissioning activities. The CxA does not take an oversight role like the CM. The CxA is part of the commissioning team and shall report directly to the Owner.

5. Contract Documents - the documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, etc.).

6. Contractors/Sub-Contractors – Construction Contractors and their Sub-Contractors who are awarded a contract for the construction or some aspect of the construction of the proje99ct in accordance with the contract documents.

7. Control System - the central building direct digital control system.

8. Deferred Functional Tests - FTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.

9. Deficiency - a condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the sequence of operations).

10. Factory Testing - testing of equipment on-site by factory personnel with an Owner's representative present.

11. Functional Performance Test (FT) - test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The commissioning authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing Contractors/Sub-Contractors or vendor. FTs are performed after construction and startup checklists, and startup are complete.

12. Construction Manager (CM) – coordinates, communicates and directs the entire process of construction in terms of scope, quality, time and cost within the authority and responsibility limits of the contract documents.

13. General Contractors (GC) - the prime Contractors for this project. Generally refers to all the GC's Sub-Contractors as well. Also referred to as the Contractors in some contexts.

14. Indirect Indicators - indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

15. Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

16. Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems.

17. Non-Compliance - see Deficiency.

18. Non-Conformance - see Deficiency.

19. Over-written Value - writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50F to 75F to verify economizer operation). See also "Simulated Signal."

20. Construction Checklist (CC) and Startup Checklist (SC) - a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CxA to the Sub contractor. Construction and startup checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some construction and startup checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). Construction and startup checklists augment and are combined with the manufacturer's startup checklist.

21. Project Manager (PM) - the contracting and managing authority for the owner over the construction of the project, a staff position.

22. Sampling - functionally testing only a fraction of the total number of identical or near identical pieces of equipment. Refer to Part 3.6, F for details.

23. Seasonal Performance Tests - FT that are deferred until the system(s) shall experience conditions closer to their design conditions.

24. Simulated Condition - condition that is created for the purpose of testing the response of a system (e.g., applying a hair dryer to a space sensor to see the response in a VAV box).

25. Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.

26. Specifications - the construction specifications of the Contract Documents.

27. Startup - the initial starting or activating of dynamic equipment, including executing startup checklists.

28. Subs - the subcontractors to the CM who provide and install building components and systems.

29. Test Procedures - the step-by-step process that must be executed to fulfill the test requirements. The CxA develops the test procedures.

30. Test Requirements - requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements are specified in the Contract Documents.

31. Trending - monitoring using the building control system.

32. Vendor - supplier of equipment.

33. Warranty Period - warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least

one year, unless specifically noted otherwise in the Contract Documents and accepted submittals. Equipment that does not initially pass seasonal or deferred functional testing shall have the warranty start date adjusted to date of passing test completion.

1.07 Systems to be Commissioned

A. The following HVAC systems and equipment shall be commissioned in this project.

1. 100% Outside Air Units

2. Split System Air Conditioners

3. Exhaust Fans, including General Exhaust, Toilet Exhaust, etc.

4. Unit Heaters

5. PTAC Units

6. Pool Dehumidification Unit

PART 2 - PRODUCTS

2.01 Test Equipment

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Contractors/Sub-Contractors for the equipment being tested.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, shall be included in the Contractors/Sub-Contractors bid price.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance. All equipment shall be calibrated within the last year, and according to the manufacturer's recommended intervals, and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

D. Refer to Para. 3.04 for details regarding equipment that may be required to simulate required test conditions.

PART 3 – EXECUTION

3.01 Meetings

A. Orientation Meeting. Within 90 days of commencement of construction, the CxA shall schedule, plan and conduct a commissioning orientation meeting with the entire commissioning team in attendance. The CxA shall provide agenda and distribute meeting minutes to all parties.

B. Miscellaneous Meetings. Other meetings shall be planned and conducted by the CxA as construction progresses. These meetings shall cover coordination, deficiency resolution and planning issues with particular Contractors/Sub-Contractors. The CxA shall organize these meetings and shall minimize unnecessary time being spent by Contractors/Sub-Contractors. For large projects, these meetings may be held monthly, until the final 3 months of construction when they may be held as frequently as one per week.

3.02 Reporting

A. The CxA shall provide regular reports to the CM and PM, with increasing frequency as construction and commissioning progresses.

B. The CxA shall regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.

C. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.

D. A final summary report by the CxA shall be provided to the PM, focusing on evaluating commissioning process. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., shall be compiled in appendices and provided with the summary report. Construction and startup checklists, functional tests and monitoring reports shall not be part of the final report, but shall be stored as the Commissioning Record in the O&M manuals.

3.03 Start-Up Checklists and Initial Checkout

A. The following procedures apply to all equipment to be commissioned, according to para. 1.07, Systems to be Commissioned. Some systems that are not comprised of actual dynamic machinery may have very simplified CCs, SCs and startup.

B. Startup and Initial Checkout Plan. The CxA shall assist the commissioning team members responsible for startup of any equipment in developing detailed startup plans for all equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures have been completed. Parties responsible for construction and startup checklists, and startup are identified in the commissioning orientation meeting and in the checklist forms.

1. The CxA provides these checklists and tests to the Contractors/Sub-Contractors. The Contractors/Sub-Contractors determines which trade is responsible for executing and documenting the tests.

2. The Contractor/Sub-Contractor responsible for the purchase of the equipment develops the full startup plan by combining (or adding to) the CxA's checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan. Where required, factory representatives shall start up the equipment. The CxA shall be notified a minimum 48 hours prior to equipment startup.

3. The Contractor/Sub-Contractor submits the full startup plan to the CxA for review.

4. The CxA reviews the procedures and the format for documenting them, noting any procedures that need to be added.

C. Sensor and Actuator Calibration

1. All field-installed temperature, relative humidity, CO, CO_2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used, if approved by the CxA beforehand. All test instruments shall have performed a certified calibration within the previous 12 months. Sensors installed in the unit at the factory with calibration certification provided, need not be field calibrated.

2. All procedures used shall be fully documented on the construction and startup checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.

3. Sensor Calibration Methods

a. All Sensors. Verify that all sensor locations are appropriate and away from causes of erratic operation. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.

b. Sensors Without Transmitters--Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent meter, gage or direct digital control system (DDCS)) is within the tolerances in the table below of the instrument-measured value. If not, install offset in DDCS, calibrate or replace sensor.

c. Sensors With Transmitters--Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and DDCS control panel. Using manufacturer's resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until the ammeter reads 4 mA. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the DDCS. Record all values and recalibrate controller as necessary to conform to specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or DDCS) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.

4. Tolerances, Standard Applications

Sensor	Required Tolerance (+/-)	Sensor	Required Tolerance (+/-)
Cooling coil, chilled and condenser water temps	0.4F	Relative humidity	4% of design
AHU wet bulb or dew point	2.0F	Combustion flue temps	5.0F
Hot water coil and boiler water temp	1.5F	Natural gas and oil flow rate	1% of design
Outside air, space air, duct air temps	0.4F	Barometric pressure	0.1 in. of Hg
Watt-hour, voltage & amperage	1% of design	Flow rates, air	10% of design
Pressures, air, water and gas	3% of design		

D. Execution of Construction and Startup Checklists, and Startup

1. The Contractors/Sub-Contractors and vendors schedule startup and checkout with the CM, PM and CxA. The performance of the construction and startup checklists, startup and checkout are directed and executed by the Contractors/Sub-Contractors or vendor. When checking off construction and startup checklists, signatures may be required of other Contractors/Sub-Contractors for verification of completion of their work.

2. The CxA shall observe, at minimum, the procedures for each piece of primary equipment. In no case shall the number of units witnessed be less than the contractual agreement on any one building.

3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CxA shall observe a sampling of the construction, and startup, and startup procedures.

4. The Contractors/Sub-Contractors and vendors shall execute startup and provide the CxA with a signed and dated copy of the completed startup, and construction and startup tests and checklists.

5. Only individuals that have direct knowledge and witnessed that a line item task on the construction and startup checklist was actually performed shall initial or check that item off. It is not acceptable for supervisors to fill out these forms.

E. Deficiencies, Non-Conformance and Approval in Checklists and Startup

1. The Contractors/Sub-Contractors shall clearly list any outstanding items of the initial startup and construction and startup procedures that were not completed successfully, and any completed corrections, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.

2. The CxA reviews the report and submits either a non-compliance report or an approval form to the Contractor/Sub-Contractor or CM. The CxA shall work with

the Contractors/Sub-Contractors and vendors to correct and retest deficiencies or uncompleted items. The CxA shall involve the CM and others as necessary. The installing Contractors/Sub-Contractors or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated startup report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA recommends approval of the execution of the checklists and start up of each system.

3. Items left incomplete, which later cause deficiencies or delays during functional testing will result in incidental damages to the responsible party. Refer to Para. 3.05.B.4 herein for details.

3.04 Functional Performance Testing

A. This sub-section applies to all commissioning functional testing for all divisions.

B. The general list of equipment to be commissioned is found in Para. 1.07.A.

C. Objectives and Scope. The objective of functional performance testing is to demonstrate that each system is operating according to the Contract Documents. During the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.

In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verifying each step in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

D. Development of Test Procedures. Before test procedures are written, the CxA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. The CxA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Contractors/Sub-Contractors or vendor responsible to execute a test shall provide limited assistance to the CxA in developing the procedures review. Prior to execution, the CxA shall provide a copy of the test procedures to the Contractors/Sub-Contractors who shall review the tests for feasibility, safety, equipment and warranty protection. When requested, the CxA will submit the tests to the A/E for review.

The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.

The test procedure forms developed by the CxA shall include (but not be limited to) the following information:

1. System and equipment or component name(s)

2. Equipment location and ID number

3. Unique test ID number, and reference to unique construction and startup checklist and startup documentation ID numbers for the piece of equipment

4. Date

5. Project name

6. Participating parties

7. A copy of the specific sequence of operations or other specified parameters being verified

8. Required pre-test field measurements

9. Instructions for setting up the test

10. Special cautions, alarm limits, etc.

11. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format

12. Acceptance criteria of proper performance with a check box to allow for clearly marking whether or not proper performance of each part of the test was achieved

13. A section for comments

14. Signatures and date block for the CxA

E. Test Methods

1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone dataloggers. The CxA may substitute specified methods or require an additional method to be executed, other than what was specified. The CxA shall determine which method is most appropriate for tests that do not have a method specified.

2. Simulated Conditions. Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.

3. Overwritten Values. Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible.

4. Simulated Signals. Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.

5. Altering Setpoints. Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable.

6. Indirect Indicators. Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. These verifications shall be completed during construction and startup testing.

7. Setup. Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The Contractor/Sub-Contractor executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractors/Sub-Contractors shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.

8. Sampling. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. It is noted that no sampling by Contractors/Sub-Contractors is allowed in construction and startup checklist execution.

F. Coordination and Scheduling. The Contractors/Sub-Contractors shall provide sufficient notice to the CxA regarding their completion schedule for the construction and startup checklists and startup of all equipment and systems. The CxA shall schedule functional tests through the CM and affected Contractors/Sub-Contractors. The CxA shall direct, witness and document the functional testing of all equipment and systems. The Contractors/Sub-Contractors shall execute the tests.

In general, functional testing is conducted after construction and startup testing has been satisfactorily completed. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.

G. Test Equipment. Refer to Part 2 for test equipment requirements.

H. Problem Solving. The CxA may recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the CM, Contractors/Sub-Contractors and A/E.

3.05 Documentation, Non-Conformance and Approval of Tests

A. Documentation. The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the CM for review and approval and to the Contractors/Sub-Contractors for review. The CxA shall include the filled out forms in the O&M manuals.

B. Non-Conformance

1. The CxA shall record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the CM on a standard non-compliance form.

2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution shall be documented on the procedure form.

3. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing Contractors/Sub-Contractors.

    a. When there is no dispute on the deficiency and the Contractors/Sub-Contractors accepts responsibility to correct it:

        1) The CxA documents the deficiency and the Contractors/Sub-Contractors response and intentions and they go on to another test or sequence. After the day's work, the CxA submits the non-compliance reports to the CM for signature, if required. A copy is provided to the Contractors/Sub-Contractors and CxA. The Contractors/Sub-Contractors corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and sends it back to the CxA.

        2) The CxA reschedules the test and the test is repeated. See sub-item 3.05.B.4.

    b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:

        1) The deficiency shall be documented on the non-compliance form with the Contractors/Sub-Contractors' response and a copy given to the CM and to the Contractors/Sub-Contractors' representative assumed to be responsible.

        2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the owners representative.

        3) The CxA documents the resolution process. The CxA will test equipment once and provide one re-test, additional cost associated with further required re-testing of the same equipment shall be borne by the responsible Contractors/Sub-Contractors.

        4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The CxA reschedules the test and the test is repeated until satisfactory performance is achieved.

4. Cost of Retesting

a. The cost for the Contractors/Sub-Contractors to retest a construction and startup or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the CM.

b. For a deficiency identified, not related to any construction and startup checklist or startup fault, the following shall apply: The CxA and CM shall direct the retesting of the equipment once at no "charge" to the Owner for their time. However, the CxA's and CM's time for a second retest shall be charged to the Contractor/Sub-Contractor, who may choose to recover costs from the responsible Sub-Contractor/vendor.

c. The time for the CxA and CM to direct any retesting required because a specific construction and startup checklist or startup test item, reported to have been successfully completed, but determined during functional testing to be faulty, shall be in the from of incidental damages to the CM, who may choose to recover costs from the party responsible for executing the faulty construction and startup test.

5. The Contractors/Sub-Contractors shall respond in writing to the CxA and Owner at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.

6. The CxA retains the original non-conformance forms until the end of the project.

7. The prime Contractors/Sub-Contractors shall not consider any required retesting by any Contractors/Sub-Contractors a justified reason for a claim of delay or for a time extension.

C. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the PM. In such case, the Contractors/Sub-Contractors shall provide the Owner with the following:

1. Within one week of notification from the CM or PM, the Contractors/Sub-Contractors or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CM or PM within two weeks of the original notice.

2. Within two weeks of the original notification, the Contractors/Sub-Contractors or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.

3. The PM shall determine whether a replacement of all identical units or a repair is acceptable.

4. Two examples of the proposed solution shall be installed by the Contractors/Sub-Contractors and the CM shall be allowed to test the installations for up to one week, upon which the PM shall decide whether to accept the solution.

5. Upon acceptance, the Contractors/Sub-Contractors and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

D. Approval. The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA. The CxA recommends acceptance of each test to the PM using a standard form. The CxA gives final approval on each test using the same form, providing a signed copy to the Contractors/Sub-Contractors.

3.06 Operation and Maintenance Manuals

A. Standard O&M Manuals

1. The specific content and format requirements for the standard O&M manuals are detailed in specifications.

2. CxA Review. Prior to substantial completion, the CxA shall review the O&M manuals, and documentation such as as-builts for systems that were commissioned to verify compliance with the contract documents. The CxA shall communicate deficiencies in the manuals to the CM, PM or A/E, as requested. Upon a successful review of the corrections, the CxA acknowledges completion of the review of these sections of the O&M manuals to the CM, PM or A/E.

B. Commissioning Record in O&M Manuals

The CxA is responsible to compile, organize and index the commissioning data by equipment into labeled, indexed and tabbed, three-ring binders and deliver it to the CM, to be included with the O&M manuals. Three copies of the manuals shall be provided.

3.07 Training of Owner Personnel

A. The CM shall be responsible for training and scheduling and ultimately ensuring that training is completed.

B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.

1. The CxA shall interview the facility manager and design engineer to determine the special needs and areas where training shall be most valuable. The Owner and CxA shall decide how rigorous the training should be for each piece of commissioned equipment. The CxA shall communicate the results to the Contractors/Sub-Contractors and vendors who have training responsibilities.

2. In addition to these general requirements, the specific training requirements of Owner personnel by Contractors/Sub-Contractors and vendors is specified in Division 23 and 26.

3. Within 60 days of contract award, each Contractors/Sub-Contractors and vendor responsible for training shall submit a written training plan to the CxA for review and approval prior to training. The plan shall cover the following elements:

   a. Equipment (included in training)

   b. Intended audience

   c. Location of training

   d. Objectives

   e. Subjects covered (description, duration of discussion, special methods, etc.)

   f. Duration of training on each subject

   g. Instructor for each subject

   h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)

   i. Instructor qualifications

4. For the primary HVAC equipment, the ATC Contractors/Sub-Contractors shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.

5. The CxA develops an overall training plan and coordinates and schedules, with the CM, the overall training for the commissioned systems. The CxA develops criteria for determining that the training was satisfactorily completed, including attending 2 of the training sessions, etc. The CxA recommends approval of the training to the PM using a standard form. The CM also signs the approval form.

3.08 Deferred Testing

A. Unforeseen Deferred Tests. If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the PM. These tests shall be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties shall be negotiated. Equipment that does not initially pass deferred functional testing shall have the warranty start date adjusted to date of passing test completion.

B. Seasonal Testing. During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity. Tests shall be executed, documented and deficiencies corrected by the appropriate Contractors/Sub-Contractors, with facilities staff and the CxA witnessing. Equipment that does not initially pass seasonal functional

testing shall have the warranty start date adjusted to date of passing test completion. Any final adjustments to the O&M manuals and as-builts due to the testing shall be made.

3.09 Written Work Products

A. The commissioning process generates a number of written work products described in various parts of the specifications. In summary, the written products are:

Product	Developed By
1. Final commissioning plan	CxA
2. Meeting minutes	CxA
3. Commissioning schedules	CxA with CM
4. Equipment documentation submittals	Responsible Installing Contractors/Sub-Contractors
5. Sequence clarifications	Responsible Installing Contractors/Sub-Contractors and A/E as needed
6. Construction and startup checklists	CxA
7. Startup and initial checkout plan	Responsible Installing Contractors/Sub-Contractors and CxA (compilation of existing documents)
8. Startup and initial checkout forms filled out	Responsible Installing Contractors/Sub-Contractors/Mfg Rep (where applicable)
9. Final TAB report	TAB
10. Commissioning Progress Record	CxA
11. Deficiency reports	CxA
12. Functional test forms	CxA
13. Filled out functional tests	CxA
14. O&M manuals	Responsible Installing Contractors/Sub-Contractors
15. Commissioning record book	CxA
16. Overall training plan	CxA and CM
17. Specific training agendas	Responsible Installing Contractors/Sub-Contractors

Product	Developed By
18. Final commissioning report	CxA
19. Misc. approvals	CxA

END OF SECTION 23 08 01

SECTION 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Control Panels
2. Thermostats
3. Actuators
4. Dampers
5. Wiring

B. Related Sections:

1. Section 23 81 13.15 (15738) – Vertical Packaged Terminal Air Conditioning Units
2. Section 23 09 93 (15940) - Sequence of Operations for HVAC Controls
3. Section 26 05 19 (16120) – Low Voltage Electrical Power Conductors and Cables
4. Variable Volume Boxes
5. Rooftop units

1.02 SYSTEM DESCRIPTION

A. Electric/Digital Electronic system consists of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

b. Each control device labeled with setting or adjustable range of control.

2. Shop Drawings: For each system to be controlled, prepare a drawing which includes a system flow diagram, control diagram, sequence of operation and schedule of components. Control diagrams shall be complete with end-to-end connections of wiring from component terminal.

3. Operation and Maintenance Data: Submit information for all products in accordance with the requirements of Specification " 01 78 23 (01830) – **“**Operating and Maintenance Data”.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an approved installer of the automatic control system manufacturer for both installation and maintenance of units required for this Project.

B. Manufacturer Qualifications: A firm experienced in manufacturing automatic temperature-control systems similar to those indicated for this Project and with a record of successful in-service performance.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."

E. The provision of 120 and 208 line voltage and 24 volt low voltage wiring, conduit, installed in accordance with National Fire Protection Association (NFPA) 70, “National Electric Code” and Division 26 of these specifications.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

1.06 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

1.07 TRAINING

A. Submit in accordance with the requirements of specification Section 01 79 00 (01820).

PART 2 PRODUCTS

2.01 CONTROL PANELS

A. MANUFACTURERS

1. Avendra, LLC Preferred Manufacturers:

a. None.

2. Approved Manufacturers:

a. Siemens Energy & Automation (800-964-4114).

b. Invensys Building Systems (formally Siebe Environmental Controls) (815-637-3000)

c. Honeywell Inc., Automation and Control Solutions (800-345-6770)

B. Local Control Panels: Unitized cabinet with suitable brackets for wall or floor mounting, located adjacent to each system under automatic control. Provide common keying for all panels.

1. Fabricate panels of 0.06-inch thick, furniture-quality steel, or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish.

2. Panel-Mounted Equipment: Mounted transformers, relays, and automatic switches; except safety devices. Mount devices with adjustments accessible through front of panel.

3. Door-Mounted Equipment: Flush-mount (on hinged door) manual switches, including damper-positioning switches, changeover switches, thermometers, and gages.

2.02 THERMOSTATS

1. Avendra, LLC Preferred Manufacturers:

a. PSG Controls, Inc. (215-257-3621)

1) “HotelStat Model 5-10506” (Cooling Units with Electric Heat)

2) “Model T5-10502” (First Company SPX Series VTAC Cooling Units with Electric Heat)

2. Approved Manufacturers:

a. Carrier Corp.; Carrier Air Conditioning Division, United Technologies Corporation (800-827-7435 x 3496).

1) "Debonair Model 33CSSN2-MH"

b. Trane, A Business of American Standard Companies (847-884-3296)

1) "Zone Controller (Thermostat)"

B. Combination Thermostat and Fan Switches: Line-voltage or low voltage thermostat with two-, three-, or four-position, push-button or lever-operated fan switch.

1. Label switches "FAN ON-OFF," "FAN HIGH-LOW-OFF," "FAN HIGH-MED-LOW-OFF." Provide unit for mounting on two-gang switch box.

C. Electric solid-state, microcomputer-based room thermostat with remote sensor. (Where indicated on drawings.)

1. Automatic switching from heating to cooling.
2. Preferential rate control to minimize overshoot and deviation from set point.
3. Set up for four separate temperatures per day.
4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
5. Short-cycle protection.
6. Programming based on every day of week.
7. Selection features include deg F display, 12- or 24-hour clock, keyboard disable, remote sensor, fan on-auto.
8. Battery replacement without program loss.
9. Thermostat backlit display features include the following:
   a. Time of day.
   b. Actual room temperature.
   c. Programmed temperature.
   d. Programmed time.
   e. Duration of timed override.
   f. Day of week.
   g. System mode indications include "heating," "off," "fan auto," and "fan on."

D. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater.

E. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type, or equivalent solid-state type, with heat anticipator, integral manual on-off-auto selector switch.

1. Equip thermostats, which control electric heating loads directly, with off position on dial wired to break ungrounded conductors.
2. Dead Band: Maximum 2 deg F.

F. Room Thermostat Cover Construction: Manufacturer's standard locking covers.

G. Room thermostat accessories include the following:

1. Insulating Bases: For thermostats located on exterior walls.

2. Thermostat Guards: Locking; heavy-duty, transparent plastic; mounted on separate base.
3. Adjusting Key: As required for calibration and cover screws.
4. Aspirating Boxes: For flush-mounted aspirating thermostats.
5. Set-Point Adjustment: 1/2-inch-diameter, adjustment knob.

2.03 ACTUATORS

A. Electric Motors: Spring-return type operators, sized to operate with sufficient reserve power to provide smooth modulating action or two-position action.

1. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
2. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.
3. Temperature Rating: Minus 22 to plus 122 deg F.
4. Damper Operator Mounting: Mount damper operators where accessible for maintenance.
    a. If located outside the duct or casing, mount operators on a 14 gauge reinforced support plate arranged to allow insulation between the support plate and the face of the duct or casing.
    b. Brace damper operators rigid to show no deflection or movement over the full range of the damper stroke.

2.04 DAMPERS

A. Dampers: Factory fabricated AMCA-rated opposed blade design of extruded aluminum, galvanized steel, with metallic antifriction nonferrous bearings.

1. Blades shall be secured to 1/2-inch diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Pressure Rating: Rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4 inches wg when damper is being held by torque of 50 in. x lbf when tested according to AMCA 500D.
4. Shafts and Bearings: Provide cadmium plated steel shafts in permanently lubricated bronze sleeve bearings or permanently lubricated ball bearings.
5. Blade: Reinforced or ribbed blades shall not exceed 8 inches in width nor 48 inches in length.
    a. Blades shall be constructed of 16 gage (minimum) galvanized steel or extruded aluminum.
    b. Flat or un-reinforced blades will not be acceptable.
    c. Damper sections exceeding 4 feet in width or 4 feet height shall be constructed with multiple frames and linkages.
6. Frames: Construct frames of factory welded 13 gage (minimum) galvanized steel hot dipped after construction or bolted extruded aluminum frames.

a. Dampers larger than 8 square feet in area shall have corner bracing gussets at each corner welded to the damper frame.

7. Linkages: Provide linkages to uniformly transmit damper operating forces to each damper blade.

a. Construct linkages of galvanized or cadmium plated steel or stainless steel.

b. Bearings and joints shall be ball and socket or sleeve bearings of brass, bronze or stainless steel, with plated bolts and locking nuts.

8. Seals: Provide mechanically attached elastomer or neoprene blade tip seal along the full length of each blade edge and flexible stainless steel seals along damper blade ends where the blades abut the frame. Adhesives or staples will not be acceptable.

9. Damper Mounting: Mount dampers to casings and ductwork in conformance with SMACNA standards. Provide welded or bolted galvanized steel structural supports for dampers larger than 20 square feet. Through bolt damper frames to structural supports.

10. Submit information showing leakage and flow characteristics, and schedule showing sizes, locations and actuators.

2.05 WIRING

A. General: Provide a complete system of electric wiring for temperature control apparatus including control power transformers and wiring to the transformer primary.

B. Insulation Level: Control circuit conductors which run in the same conduit as power circuit conductors shall have the same insulation level as adjacent power conductors.

C. NFPA 70: All wiring shall conform to the requirements of the NFPA 70.

D. Wiring: Wire for low voltage AC shall be minimum 300 volt insulated copper No. 18 AWG or larger conforming to NFPA 70, Type MTW, THHN or TFFN.

1. For low voltage DC and an electronic circuit carrying less than 0.5 amperes, cables of two or more conductors not smaller than No. 18 AWG solid copper or No. 18 AWG solid copper if not shielded may be used in lieu of individual wires.

2. Cables carrying analog signals shall be shielded.

3. Cables shall be terminated in solder or screw type terminal strips.

4. Cables shall not be tapped at any intermediate points.

5. All wire shall not be color coded or numbered for identification. Identify as indicated on shop drawings and “As-Built” drawings.

6. Wire terminating in screw type terminal strips shall have pressure connectors conforming to UL 486A, “Wire Connectors and Soldering Lugs for Use With Copper Conductors”, or UL 486B, “Wire Connectors for Use With Aluminum Conductors”.

7. Wire terminations without connectors or travelling pressure pads will not be accepted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that duct-, pipe-, and equipment-mounted devices and wiring are installed before proceeding with installation.

3.02 INSTALLATION

A. Install equipment level and plumb.

B. Verify location of thermostats and other exposed control sensors with plans and room details before installation, unless otherwise indicated on the mechanical, electrical, or architectural drawings. Locate all wall mounted devices 60 inches above the floor.

C. Install guards on thermostats in the following locations:

1. Where indicated on drawings.

D. Install damper motors on duct exterior. Do not locate operators exposed to outdoor temperatures. Arrange actuators to “Fail Safe” in the event of power failure.

E. Install labels and nameplates to identify control components according to Section 23 05 53 (15075) - " Identification for HVAC Piping and Equipment."

3.03 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Division 26.

B. Install building wire and cable according to Section 26 05 19 (16120) - "Low Voltage Electrial Power Conductors and Cables."

C. Install signal and communication cable according to Division 26.

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.

2. Install exposed cable in raceway.

3. Bundle and harness multi-conductor instrument cable in place of single cables where several cables follow a common path.

4. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.

5. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.

D. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

F. All wall-mounted space sensors such as thermostats shall be securely anchored to an electrical box. Do not mount devices directly to the wall surfaces.

G. Identification: Labor or color code each filed wire and conduit at each controller and controlled device.

1. Identification shall be permanent and not subject to fading.

2. Permanently mark terminal blocks at wire termination points.

3.04 FIELD QUALITY CONTROL

A. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units, and retest.

B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment, and retest.

C. Replace damaged or malfunctioning controls and equipment.

1. Start, test, and adjust control systems.

2. Demonstrate compliance with requirements, including calibration and testing, and control sequences.

3. Adjust, calibrate, and fine tune circuits and equipment to achieve sequence of operation specified.

3.05 DEMONSTRATION AND TRAINING

A. Demonstration: Include start-up, automatic and manual operation, and emergency modes of use in accordance with the prescribed sequence of operations. Should the HVAC system demonstration fail to operate properly, the system shall be repaired, recalibrated, and retested as necessary.

B. Train Owner's maintenance personnel to adjust, operate, and maintain control systems and components.

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

2. Conduct training as specified in Section 01 79 00 (01820) - "Training".

3.06 POST OCCUPANCY ON-SITE ASSISTANCE

A. Occupancy Adjustments: Within one year of date of Substantial Completion, provide up to three 2-hour on-site Project visits, when requested by Owner, to adjust and calibrate components and to assist Owner's personnel in making program changes, adjust sensors and controls to suit actual conditions, and assist in the diagnostics of HVAC problems.

END OF SECTION

SECTION 23 09 93 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Control Sequences for HVAC Systems, Subsystems, And Equipment.

B. Related Sections:

1. Section 23 09 00 (15900) - Instrumentation and Control for HVAC.

1.02 SEQUENCES

A. (PTAC) Package Terminal Air Conditioning Units.

1. Service: As shown on the drawings.
2. Integral (remote) thermostat shall cycle fan, compressor and electric heat to maintain space set point temperature.
3. Remove temperature limiters.

B. (FCU) Split System Fan Coil Units

1. Service: As shown on the drawings.
2. Where required, duct mounted addressable Smoke Detector shall stop unit and notify building fire alarm system upon detection of smoke.
3. Provide complete with fan selector and sub-base with fan ON/OFF/AUTO switch.
4. With system switch in “AUTO” position, heating or cooling shall be provided as required via automatic changeover, fan shall run continuously.
5. With system switch in “COOL” position, cooling shall cycle on in stages when space temperature exceeds thermostat set point.
6. With system switch in “HEAT” position, heat shall cycle on in stages when space temperature is below thermostat set point.
7. In all occupied sequences, the outside air damper shall be set to the minimum position.

C. (EUH) Electric Unit Heaters.

1. Service: As shown on the drawings.
2. Integral thermostat shall cycle fan and resistance heat to maintain space set point temperature.

D. (ECH) Electric Cabinet Unit Heaters

1. Service: As shown on the drawings.
2. Integral thermostat shall cycle resistance heating, element to maintain space set point temperature.

E. (EWH) Electric Wall Heaters

1. Service: As shown on the drawings.
2. Integral thermostat shall cycle resistance heating, element to maintain space set point temperature.

F. Public Toilet Room Exhaust.

1. The exhaust fan shall run continuously, 24 hours per day.

G. Guest Room Bathroom Exhaust.

1. The contractor shall provide a separate switch for exhaust fan in shower rooms.
2. The central exhaust fan shall run continuously 24 hours per day.

H. (PDU) Pool Dehumidification Unit

1. Service: Pool area
2. The PDU shall operate as required by manufacturer's specification and be controlled by a microprocessor supplied with PDU equipment; sequence heating, cooling and dehumidification as called for by space thermostat and humidistat and system microprocessor.
3. O.A. Damper with timeclock control for occupied and unoccupied.
4. Flow switch shall be interlocked with pool recirculating pumps.
5. Electric duct heaters shall operate in conjunction with the PDU Unit control sequence. Unit shall sequence heat on in multiple stages. Heater shall have overheat and airflow safety switches in addition to U.L., N.E.C. and Code requirements.
6. Interlock pool PDU with water heaters for staging.
7. Pool Exhaust fan runs continuous.

I. Combustion Air Louver Dampers

1. Interlock with gas fired equipment to open when equipment fires up.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 23 21 13.33

CONDENSATION DRAIN AND DRAIN PIPING SYSTEMS

PART 1 GENERAL

1.01 REFERENCE

Section 23 05 00 - COMMON WORK RESULTS FOR HVAC
Section 23 07 00 - HVAC INSULATION

1.02 SCOPE

A. Provide condensation drain piping from outlets on drain pans of all cooling coils, and run indirect to floor drains and elsewhere as shown on the Drawings.

B. Provide drain piping from drain valves and overflows to floor drains and elsewhere as indicated.

PART 2 PRODUCTS

2.01 PIPE

A. Type "L" hard copper, minimum size 1 inch. Specify that wrought copper fittings with sweat joints of 95-5 solder be used. Trap drain lines and run to suitable drains.

2.02 Fittings cast brass drainage fittings.

PART 3 EXECUTION

3.01 Provide cleanouts at traps and in the piping system where pipe changes direction.

3.02 Pitch all condensation and other drain lines down a minimum of 1" in 30' in the direction of flow.

3.03 Prior to leaving the jobsite, the HVAC Contractor shall flood the cooling coil drain pans with the units operating to verify that the drain pans are draining properly.

END OF SECTION 23 21 13.33

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Tubes.
2. Fittings.
3. Joining Materials.
4. Specialties.

B. Related Sections:

1. Section 07 92 00 (07920) - Joint Sealants
2. Section 07 84 00 (07840) - Firestopping: Firestopping materials and requirements for penetrations through fire and smoke barriers.
3. Section 23 05 00 (15050) – Common Work Results for HVAC
4. Section 23 05 29 (15060) - Hangers and Supports for HVAC Piping and Equipment: for pipe hanger restraints.
5. Section 23 05 53 (15075) – Identification for HVAC Piping and Equipment
6. Section 22 07 00 (15083) - HVAC Insulation

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data for each valve type and refrigerant piping specialty specified.
2. Refrigerant piping indicated is schematic only. Contractor shall size and design the piping configuration and install the piping, including oil traps, double risers, specialties, and pipe and tube sizes, to ensure proper operation and conformance with warranties of connected equipment.
3. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience.
4. Maintenance data for refrigerant valves and piping specialties to include in the operation and maintenance manual specified in Division 01 Sections.

1.03 QUALITY ASSURANCE

A. ASME Compliance: Qualify brazing and welding processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications."

B. Regulatory Requirements: Comply with provisions of the following codes:

1. ASME B31.5, "Refrigeration Piping."
2. ASHRAE 15, "Safety Code for Mechanical Refrigeration."

C. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Non-electrical"; or UL 429, "Electrically Operated Valves."

D. Listing and Labeling: Provide products specified in this Section that are UL listed and labeled.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Refrigerant Valves and Specialties:

a. None.

B. Approved Manufacturers:

1. Refrigerant Valves and Specialties:

a. Henry Pratt Company, Subsidiary of Mueller Water Products, Inc. (877-436-7966)

b. Parker-Hannifin Corporation; Refrigeration & Air Conditioning Division (800-272-7537)

c. Sporlan Valve Company (314-647-2775)

2.02 TUBES

A. Use pre-charged tubing where possible.

B. Soft Copper Tube: ASTM B280, Type ACR, annealed temper.

2.03 TUBE FITTINGS

A. Copper Fittings: ASME B16.22, wrought-copper streamlined pattern.

2.04 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (Silver).

2.05 REFRIGERANT PIPING SPECIALTIES

A. Moisture/Liquid Indicators: 500-psig operating pressure, 200 deg F operating temperature; forged-brass body, with replaceable, polished, optical viewing window with color-coded moisture indicator, and solder-end connections.

B. Permanent Filter-Dryer: 350-psig maximum operating pressure, 225 deg F maximum operating temperature; steel shell, and wrought-copper fittings for solder-end connections; molded-felt core surrounded by desiccant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine roughing-in for compliance with requirements for installation tolerances and other conditions affecting performance of refrigerant piping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

A. Above ground, within Building: Type ACR drawn-copper tubing.

B. Below ground for 2-Inch NPS (DN50) and Smaller: Type L (Type B) annealed-copper tubing installed in schedule 40 PVC sleeve.

3.03 INSTALLATION

A. Install refrigerant piping according to ASHRAE 15.

B. Basic piping installation requirements are specified in Section 21/22/23 95 00 (15050) - "Basic Mechanical Materials and Methods."

C. Install piping in short and direct arrangement, with minimum number of joints, elbows, and fittings.

D. Arrange piping to allow normal inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.

E. Install piping with adequate clearance between pipe and adjacent walls and hangers, or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation. Maximum fill: 40%

F. Below ground, install copper tubing in schedule 40 PVC conduit. Vent conduit outdoors.

G. Insulate suction lines.

1. Do not install insulation until system testing has been completed and all leaks have been eliminated.

H. Install branch lines to parallel compressors of equal length, and pipe identically and symmetrically.

I. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

J. Slope refrigerant piping as follows:

1. Install horizontal suction lines with a uniform slope of 0.4 percent downward to compressor.

2. Install traps and double risers where indicated and where required to entrain oil in vertical runs.

3. Liquid lines may be installed level.

K. Use fittings for changes in direction and branch connections.

L. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

M. Reduce pipe sizes using eccentric reducer fittings installed with level side down.

N. Provide bypass around moisture-liquid indicators in lines larger than 2-inch NPS (DN50).

O. Install unions to allow removal of solenoid valves, pressure-regulating valves, expansion valves, and at connections to compressors and evaporators.

P. Install refrigerant valves according to manufacturer's written instructions.

Q. When brazing, remove solenoid-valve coils; remove sight glasses; and remove stems, seats, and packing of valves, and accessible internal parts of refrigerant specialties. Do not apply heat near bulb of expansion valve.

R. Electrical wiring for solenoid valves is specified in Division 16 Sections. Coordinate electrical requirements and connections.

S. Charge and purge systems, after testing, dispose of refrigerant following ASHRAE 15 procedures.

3.04 HANGERS AND SUPPORTS

A. General: Hangers, supports, and anchors are specified in Section 23 05 29 - "Hangers and Supports for HVAC Piping and Equipment." Provide according to ASME B31.5 and MSS SP-69.

B. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes. Tube sizes are nominal or standard tube sizes as expressed in ASTM B88.

1. 1/2 Inch: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. 5/8 Inch: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. 1 Inch: Maximum span, 60 inches; minimum rod size, 1/4 inch.
4. 1-1/4 Inches: Maximum span, 72 inches; minimum rod size, 1/4 inch.
5. 1-1/2 Inches: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.05 PIPE INSULATION

A. Piping insulation is specified in Section 23 07 00 “HVAC Insulation”.

3.06 SPECIALTIES APPLICATION AND INSTALLATION

A. Install permanent filter dryers in low-temperature systems using hermetic compressors, and before each solenoid valve.

3.07 PIPE JOINT CONSTRUCTION

A. Basic pipe and tube joint construction is specified in Section 23 05 00 - "Common Work Results for HVAC."

B. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent formation of scale.

3.08 VALVE INSTALLATIONS

A. Install refrigerant valves according to manufacturer's written instructions.

3.09 CONNECTIONS

A. Electrical: Conform to applicable requirements of Division 26 Sections for electrical connections.

3.10 FIELD QUALITY CONTROL

A. Inspect and test refrigerant piping according to ASME B31.5, Chapter VI.

1. Pressure test with nitrogen to 200 psig. Perform final tests at 27-psig vacuum and 200 psig using halide torch or electronic leak detector. Test to no leakage.

B. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

C. Repair leaks using new materials; retest.

3.11 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

3.12 CLEANING

A. Before installation of copper tubing other than Type ACR, clean tubing and fittings with trichloroethylene.

3.13 COMMISSIONING

A. Charge system using the following procedures:

1. Install core in filter dryer after leak test, but before evacuation.
2. Evacuate refrigerant system with vacuum pump until temperature of 35 deg is indicated on vacuum dehydration indicator.
3. During evacuation, apply heat to pockets, elbows, and low spots in piping.

4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
5. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
6. Complete charging of system, using new filter-dryer core in charging line. Provide full-operating charge.

END OF SECTION

SECTION 23 31 13 - METAL DUCTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sheet Metal Materials.
2. Duct Liner.
3. Sealant Materials.
4. Hangers and Supports.
5. Duct Fabrication.

B. Related Sections:

1. Section 07 84 00 (07840) - Firestopping: For fire-resistant sealants for use around duct penetrations and fire-damper installations in fire-rated floors, partitions, and walls.
2. Section 08 31 00 (08310) - Access Doors: For wall- and ceiling-mounted access doors for access to concealed ducts.
3. Section 23 05 93 (15950) - Testing, Adjusting, and Balancing: For air balancing and final adjusting of manual-volume dampers.
4. Section 23 07 00 (15081) – HVAC Insulation: For duct insulation.
5. Section 23 33 00 (15820) – Air Duct Accessories: For dampers, sound-control devices, duct-mounted access doors and panels, turning vanes, and flexible ducts.
6. Section 23 37 00 (15850) - Air Outlets and Inlets

1.02 DEFINITIONS

A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168.

1.03 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by the Engineer of Record. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:
   a. For duct liner and sealing materials.
2. Welding Certificates: Copies of certificates indicating welding procedures and personnel comply with requirements in "Quality Assurance" Article.
3. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
4. Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

1.05 QUALITY ASSURANCE

A. Welding Standards: Qualify welding procedures and welding personnel to perform welding processes for this Project according to AWS D1.1, "Structural Welding Code--Steel" for hangers and supports; AWS D1.2, "Structural Welding Code--Aluminum," for aluminum supporting members; and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.

C. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

D. Comply with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," Chapter 3, "Duct System," for range hood ducts, unless otherwise indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store stainless-steel sheets with mill-applied adhesive protective paper maintained through fabrication and installation.

PART 2 PRODUCTS

2.01 SHEET METAL MATERIALS

A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A653, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

B. Carbon-Steel Sheets: ASTM A366, cold-rolled sheets; commercial quality; with oiled, exposed matte finish.

C. Stainless Steel: ASTM A480, Type 316, sheet form with No. 4 finish for surfaces of ducts exposed to view; and Type 304, sheet form with No. 1 finish for concealed ducts.

D. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.02 DUCT LINER

A. General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."

B. Materials: ASTM C1071 with coated surface exposed to airstream to prevent erosion of glass fibers.

1. Thickness: 1 inch.

2. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.

3. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.

4. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C916.

5. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.

    a. Tensile Strength: Indefinitely sustain a 50-lb- tensile, dead-load test perpendicular to duct wall.

    b. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch into airstream.

    c. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.03 SEALANT MATERIALS

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

1. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.

2. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.

3. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C920, Type S, Grade NS, Class 25, Use O.

2.04 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.

2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.

1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.

2. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A36/A36M.

1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.

2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.

2.05 RECTANGULAR DUCT FABRICATION

A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.

2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.

B. Fabricate range hood exhaust ducts with 0.0598-inch-thick, carbon-steel sheet for concealed ducts and 0.0500-inch-thick stainless steel for exposed ducts. Weld and flange seams and joints. Comply with NFPA 96.

2.06 SHOP APPLICATION OF LINER IN RECTANGULAR DUCTS

A. Adhere a single layer of indicated thickness of duct liner with 90 percent coverage of adhesive at liner contact surface area. Multiple layers of insulation to achieve indicated thickness are prohibited.

B. Apply adhesive to liner facing in direction of airflow not receiving metal nosing.

C. Butt transverse joints without gaps and coat joint with adhesive.

D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.

E. Do not apply liners in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.

F. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely around perimeter; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.

G. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profile or are integrally formed from duct wall. Fabricate edge facings at the following locations:

1. Fan discharge.

2. Intervals of lined duct preceding unlined duct.

H. Terminate liner with duct buildouts installed in ducts to attach dampers, turning vane assemblies, and other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct wall with bolts, screws, rivets, or welds. Terminate liner at fire dampers at connection to fire-damper sleeve.

2.07 ROUND DUCT FABRICATION

A. Round Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

2.08 ROUND SUPPLY AND EXHAUST FITTING FABRICATION

A. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.

B. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.

C. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate bend radius of die-formed, gored, and pleated elbows one and one-half times elbow diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

2. 90-Degree, Two-Piece, Mitered Elbows: Use only for supply systems, or exhaust systems for material-handling classes A and B; and only where space restrictions do not permit using 1.5 bend radius elbows. Fabricate with single-thickness turning vanes.

3. Round Elbows, 8 Inches and Smaller: Fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate

nonstandard bend-angle configuration or nonstandard diameter elbows with gored construction.

4. Round Elbows, 9 through 14 Inches: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees, unless space restrictions require a mitered elbow. Fabricate nonstandard bend-angle configuration or nonstandard diameter elbows with gored construction.
5. Round Elbows, Larger Than 14 Inches: Fabricate gored elbows, unless space restrictions require a mitered elbow.
6. Die-Formed Elbows for Sizes through 8 Inches and All Pressures: 0.040 inch thick with two-piece welded construction.

PART 3 EXECUTION

3.01 DUCT INSTALLATION, GENERAL

A. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.

B. Construct and install each duct system for the specific duct pressure classification indicated.

C. Install round ducts in lengths not less than 12 feet, unless interrupted by fittings.

D. Install ducts with fewest possible joints.

E. Install fabricated fittings for changes in directions, changes in size and shape, and connections.

F. Install couplings tight to duct wall surface with a minimum of projections into duct.

G. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.

H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

I. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

J. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.

K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

L. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults, electrical equipment spaces and enclosures, and through elevator equipment rooms.

M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches.

N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Section 23 33 00 "Air Duct Accessories." Firestopping materials and installation methods are specified in Section 07 84 00 "Firestopping."

3.02 RANGE HOOD EXHAUST DUCT INSTALLATIONS

A. Install ducts to allow for thermal expansion of ductwork through 2000 deg F temperature range.

B. Install ducts without dips or traps that may collect residues, unless traps have continuous or automatic residue removal.

C. Install access openings and doors at each change in direction and at 20-foot intervals; locate on sides of duct a minimum of 1-1/2 inches from bottom; and fit with grease-tight covers of same material as duct.

D. Do not penetrate fire-rated assemblies.

E. Provide cleanouts at the base of each riser and where required.

3.03 SEAM AND JOINT SEALING

A. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Pressure Classification Less Than 2-Inch wg: Transverse and longitudinal joints.

C. Seal externally insulated ducts before insulation installation.

D. Materials: 3M Brand No. 800.

3.04 HANGING AND SUPPORTING

A. Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

C. Support vertical ducts at a maximum interval of 16 feet and at each floor.

D. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

E. Install concrete inserts before placing concrete.

F. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

3.05 CONNECTIONS

A. Connect equipment with flexible connectors according to Section 23 33 00 (15820) "Duct Accessories."

B. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

C. Leakage Test: Perform tests according to SMACNA's "HVAC Air Duct Leakage Test Manual."

3.06 ADJUSTING

A. Refer to Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for detailed procedures.

3.07 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect the system. Vacuum interior as well as exterior of ducts before final acceptance to remove dust and debris.

END OF SECTION

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Manual-Volume Dampers
2. Fire Dampers
3. Turning Vanes
4. Duct-Mounted Access Doors
5. Flexible Connectors
6. Flexible Ducts
7. Accessories

B. Related Sections:

1. Section 08 31 00 (08310) - Access Doors and Panels: For wall- and ceiling-mounted access doors and panels.
2. Section 23 37 00 (15850) - Air Outlets and Inlets.
3. Section 28 31 00 (13850) - Fire Alarm and Detection Systems: For duct-mounted fire and smoke detectors.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For the following:
   a. Manual-volume dampers.
   b. Fire dampers.
   c. Duct-mounted access doors.
   d. Flexible ducts.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:
   a. Special fittings and manual- and automatic-volume-damper installations.
   b. Fire damper installations, including sleeves and duct-mounted access doors and panels.
3. Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

1.03 QUALITY ASSURANCE

A. NFPA Compliance: Comply with the following NFPA standards:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Sheet Metal and Air Conditioning Contractors National Association, Inc. manuals (SMACNA) except where details or notes on drawings indicate otherwise.

1. HVAC Construction Standards Metal and Flexible.
2. Fire Damper and Heat Stop Guide for Air Handling Systems.

C. Underwriters Laboratories (UL) Standard for Safety UL 181, UL 555.

1.04 EXTRA MATERIALS

A. Furnish extra materials described in Section 01 78 43 (01790) “Spare Parts and Materials” that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Manual Volume Dampers
   a. None
2. Fire Dampers.
   a. None
3. Flexible Connectors
   a. None
4. Flexible Ducts
   a. None

B. Approved Manufacturers:

1. Manual Volume Dampers.
   a. Ruskin Company (816-761-7476)
   b. Air Balance, Division of Mestek (419-865-5000)
   c. Prefco (Perfect Air Control, Inc.) (800-437-6653)
2. Fire Dampers.
   a. Ruskin Company (816-761-7476)
   b. Air Balance, Division of Mestek (419-865-5000)
   c. Prefco (Perfect Air Control, Inc.) (800-437-6653)
   d.)
3. Flexible Connectors.
   a. Ventfabrics, Inc. (800-621-1207)
   b. Ward Industries, Inc. (630-595-7320)
   c. Vent Products Co. (800-368-8368)
4. Flexible Ducts.
   a. Clevaflex. Ltd. (216-941-6505)
   b. Approved Substitution

2.02 MANUAL-VOLUME DAMPERS

A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.

2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized, sheet steel.

3. Blade Axles: Nonferrous.

4. Tie Bars and Brackets: Galvanized steel.

C. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.03 FIRE DAMPERS

A. General: Labeled to UL 555.

B. Fire Rating: One and one-half hour unless noted otherwise.

C. Frame: SMACNA Type B with blades out of airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

D. Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.

1. Minimum Thickness: 0.052 inch or 0.138 inch thick and length to suit application.

2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

E. Mounting Orientation: Vertical or horizontal as indicated.

F. Blades: Roll-formed, interlocking, 0.034 inch thick, galvanized, sheet steel. In place of interlocking blades, use full-length, 0.034 inch thick, galvanized steel blade connectors.

G. Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.

H. Fusible Link: Replaceable, 165 F rated as indicated.

I. Provide access door in duct adjacent to each fire damper.

2.04 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Manufactured Turning Vanes: Fabricate of 1-1/2 inch wide, curved blades set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into side strips suitable for mounting in ducts.

2.05 DUCT-MOUNTED ACCESS DOORS

A. General: Fabricate doors airtight and suitable for duct pressure class.

B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.

C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

E. Insulation: 1-inch thick, fibrous-glass.

2.06 FLEXIBLE CONNECTORS

A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 2-3/4 inch wide, 0.028 inch thick, galvanized, sheet steel. Select metal compatible with connected ducts.

C. Transverse Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 4-3/8 inch wide, 0.028 inch thick, galvanized, sheet steel Select metal compatible with connected ducts.

D. Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.

1. Minimum Weight: 26 oz./sq. yd.

2. Tensile Strength: 480 lbf/inch in the warp, and 360 lbf/inch in the filling.

3. Minimum Movement: 2 inches.

E. Conventional, Outdoor System Flexible Connector Fabric: Glass fabric double coated with a synthetic-rubber, weatherproof coating resistant to the sun's ultraviolet rays and ozone environment.

1. Minimum Weight: 26 oz./sq. yd.

2. Tensile Strength: 530 lbf/inch in the warp, and 440 lbf/inch in the filling.

3. Minimum Movement: 2 inches.

F. High-Corrosive-Environment System Flexible Connectors: Glass fabric coated with a chemical-resistant coating (For use in pool area equipment room).

1. Minimum Weight: 14 oz./sq. yd.

2. Tensile Strength: 450 lbf/inch in the warp, and 340 lbf/inch in the filling.

3. Minimum Movement: 2 inches.

2.07 FLEXIBLE DUCTS

A. General: Comply with UL 181, Class 1.

B. Flexible Ducts, Uninsulated: Corrugated aluminum. For use on dryer vents only.

C. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch thick, glass-fiber insulation around a continuous inner liner.

1. Reinforcement: Steel-wire helix encapsulated in inner liner.

2. Outer Jacket: Glass-reinforced, silver Mylar with a continuous hanging tab, integral fibrous-glass tape, and nylon hanging cord.

3. Inner Liner: Polyethylene film.

D. Pressure Rating: 6-inch wg positive, 1/2-inch wg negative.

2.08 ACCESSORIES

A. Louvers:

1. Provide blank off panels for unused portions of louvers. Panels shall be double wall construction with 0.032 inch aluminum, and 2 inch thick, internal glass fiber insulation in accordance with SMACNA “HVAC Duct Construction Standards.”

B. Open ducts in suspended ceiling: No. 16 USSG, ¾ inch square mesh, screen over each opening; with 1 inch wide galvanized steel enclosing frame and flanged duct opening to receive frame. In lieu or screen and volume damper, provide register or grille plus opposed blade volume damper.

C. Duct sleeves: Minimum 20 gauge USSG galvanized sheet steel unless otherwise indicated.

1. Clearances:

a. Non-insulated duct: 1 inch between duct and sleeve on all sides.

b. Insulated duct: 1 inch between insulation and sleeve on all sides.

c. Grilles, registers and diffusers: Zero clearance.

2. Provide closure collars for exposed ducts on each side of wall or floor opening. Collars shall be galvanized sheet metal, minimum 4 inch wide, and fit tight against surface and around duct or insulation. Install with nails 6 inch on center.

3. Framed openings: Provide clearances and closure collars the same as for duct sleeves.

4. Duct-mounted automatic control devices: Mount on mechanical equipment all devices related to automatic controls such as automatic dampers.

D. Cleanout Doors (Kitchen and Laundry Dryer Exhaust): Horizontal ducts shall be mounted maximum 20 ft. apart and in change of direction. Cleanout doors on horizontal duct shall be mounted on side of duct. Bottom edge shall be not less than 2 inch above bottom of duct. Cleanout doors at veritical ducts shall be mounted at base. Door and frame shall be same gauge as duct. Hinges shall be Ventlock No. 260, extra heavy zinc plated. Latches shall be Ventlock No. 140, cast zinc. Gaskets shall be between door and frame. Gaskets shall be 1/8 inch double thickness rated 2,000 deg F for kitchen exhaust system. Cleanout door size shall be maximum 24 inch x 24 inch and minimum shall be 24 inch one side, and other side shall be 2 inch less than duct height.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.

B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.

C. Provide test holes at fan inlet and outlet and elsewhere as indicated.

D. Install fire dampers according to manufacturer's UL-approved written instructions.

1. Install fusible links in fire dampers.

E. Install duct access panels for access to both sides of duct coils. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, automatic dampers, smoke detectors, outside and exhaust air plenums equipment, and other locations as indicated.

1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.

2. Install access panels on side of duct where adequate clearance is available.

F. Label access doors according to Section 23 05 53 "Identification for HVAC Piping and Equipment."

G. Provide flexible connections at fan and building joints.

H. Install automatic dampers supplied by the automatic temperature control system manufacturer. Notch end of rod and label duct/casing to indicate open and closed blade position.

I. Provide volume dampers at following locations:

1. In all duct splits and branch connections of supply, return, and exhaust systems.
2. Ducts connecting to common plenums.
3. Ducts serving single outlet.
4. At open return duct in hung ceiling.
5. Other locations as indicated on drawings.

J. Provide access doors in following locations and as indicated on the drawings.

1. Automatic dampers: linkage side.
2. Main balancing dampers.
3. Fire dampers.
4. Smoke detection heads.
5. On both sides of ducts where necessary to provide maintenance accessibility to equipment on the other side.
6. Outside air and exhaust air plenums.

K. Flexible duct installation.

1. Installation shall be in accordance with SMACNA and local building code standards.
2. Flexible duct runs shall be a maximum of 5 feet, straight lengths, no bends.
3. Connections to beaded sheet metal fittings shall be with 3 wraps of approved tape and stainless steel draw band for tight seal. Seal the outer jacket with 3 wraps of approved UL 181B tape.
4. A 1 ½" minimum strap shall be used to support the flexible duct at a distance not greater than 5'-0". Maximum permissible sag is ½" per foot of duct length.

3.02 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Adjust fire dampers for proper action.

C. Final positioning of manual-volume dampers is specified in Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC".

END OF SECTION

SECTION 23 34 23 - HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Centrifugal Roof Ventilators.
2. Up-blast Propeller Roof Exhaust Fans (Kitchen Hood Exhaust).
3. Ceiling-Mounted Ventilators.
4. Motors
5. Factory Finishes
6. Quality Control

B. Related Sections:

1. Section 23 05 00 (15050) – Common Work Results for HVAC
2. Section 23 05 48 (15070) - Mechanical Sound, Vibration and Seismic Control.
3. Section 23 05 53 (15075) – Identification for HVAC Piping and Equipment
4. Section 23 05 13 (15090) – Common Motor Requirements for HVAC Equipment
5. Section 23 05 93 (15950) - Testing, Adjusting, and Balancing for HVAC
6. Section 26 29 13 (16420) - Enclosed Controllers: For motor starters.

C. Products Supplied But Not Installed Under This Section:

1. Roof curbs for roof-mounted exhaust fans.

1.02 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base air ratings on actual site elevations.

B. Operating Limits: Classify according to AMCA 99.

C. Fan Schedule: The following information is described in an equipment schedule on the Drawings.

1. Fan performance data including capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
2. Fan arrangement including wheel configuration, inlet and discharge configurations, and required accessories.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data including rated capacities of each unit, weights (shipping, installed, and operating), furnished specialties, accessories, and the following:
   a. Certified fan performance curves with system operating conditions indicated.
   b. Certified fan sound power ratings.
   c. Motor ratings and electrical characteristics plus motor and electrical accessories.
   d. Material gages and finishes, including color charts.
   e. Dampers, including housings, linkages, and operators.

2. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

3. Wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.

4. Maintenance data for power ventilators to include in the operation and maintenance manual specified in Division 01 and in Section 23 05 00 "Common Work Results for HVAC."

1.04 QUALITY ASSURANCE

A. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.

B. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

C. AMCA Compliance: Provide products that meet performance requirements and are licensed to use the AMCA Seal.

D. NEMA Compliance: Provide components required as part of fans that comply with applicable NEMA standards.

E. UL Standard: Provide power ventilators that comply with UL 705.

1.05 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements. Verify clearances.

B. Do not operate fans until ductwork is clean, filters are in place, bearings are lubricated, and fans have been commissioned.

1.06 COORDINATION AND SCHEDULING

A. Coordinate the size and location of structural steel support members.

B. Coordinate the installation of roof curbs, equipment supports, and roof penetrations. Roof specialties are specified in Division 07 Sections.

1.07 EXTRA MATERIALS

A. Furnish extra materials described in Section 01 78 43 (01790) “Spare Parts and Materials” that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Ceiling-Mounted Ventilators:

a. None.

B. Approved Manufacturers:

1. Ceiling-Mounted Ventilators:

a. Carnes Co. (608-845-6411)

b. Loren Cook Company (417-869-6474)

c. Greenheck Fan Corporation(715-359-6171)

d. PennBarry (972-234-3202)

2.02 CEILING-MOUNTED VENTILATORS

A. Description: Centrifugal fans designed for installing in ceiling or wall, or for concealed in-line applications.

B. Housing: Galvanized steel lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Aluminum, louvered grille or eggcrate with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Variable-Speed Controller Mounted on Fan Housing: Solid-state control to reduce speed from 100 percent to less than 50 percent.

G. Sound Level: Maximum of 1.5 Sones in Guestroom Toilets

H. Accessories: Manufacturer's standard roof jack or wall cap, and transition fittings.

I. .

2.03 MOTORS

A. Refer to Section 23 05 13 - "Common Motor Requirements for HVAC Equipment" for general requirements for factory-installed motors.

B. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.

C. Enclosure Type: The following features are required as indicated:

1. Open dripproof motors where satisfactorily housed or remotely located during operation.

2.04 FACTORY FINISHES

A. Sheet Metal Parts: Prime coat before final assembly.

B. Exterior Surfaces: Baked-enamel finish coat after assembly.

C. Aluminum Parts: No finish required.

2.05 SOURCE QUALITY CONTROL

A. Testing Requirements: The following factory tests are required as indicated:

1. Sound Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA Seal.

2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements of installation tolerances and other conditions affecting performance of the power ventilators. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install power ventilators according to manufacturer's written instructions.

B. Support units using the vibration-control devices indicated. Vibration-control devices are specified in Section 23 05 48 - "Vibration, and Seismic Control for HVAC Piping and Equipment."

1. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.

a. Installation of roof curbs is specified in Division 07 Sections.

2. Suspend units from structural steel support frame using threaded steel rods and vibration isolation springs.

3. Ceiling Units: Suspend units from structure using steel wire or metal straps.

C. Install units with clearances for service and maintenance.

D. Label units according to requirements specified in Section 23 05 53 "Identification for HVAC Piping and Equipment."

3.03 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

B. Electrical: Conform to applicable requirements in Division 16 Sections.

C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly of components and installation of fans, including duct and electrical connections, and to report results in writing.

3.05 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Lubricate bearings.

3.06 CLEANING

A. After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

B. Clean fan interiors to remove foreign material and construction debris. Vacuum clean fan wheel and cabinet.

3.07 COMMISSIONING

A. Final Checks before Startup: Perform the following operations and checks before startup:

1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections for piping, ducts, and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnects.

3. Perform cleaning and adjusting specified in this Section.

4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.

5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
6. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in the fully open position.
7. Disable automatic temperature-control operators.

B. Starting procedures for fans are as follows:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
2. Measure and record motor voltage and amperage.

C. Shut unit down and reconnect automatic temperature-control operators.

D. Refer to Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for procedures for air-handling-system testing, adjusting, and balancing.

E. Replace fan and motor pulleys as required to achieve design conditions.

3.08 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

1. Conduct training as specified in Section 01 79 00 (01820) "Training".
2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive.

END OF SECTION

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Diffusers
2. Registers
3. Grilles

B. Related Sections:

1. Section 23 33 00 (15820) – Air Duct Accessories.
2. Section 23 05 93 (15950) - Testing, Adjusting, and Balancing for HVAC.

1.02 DEFINITIONS

A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.

B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.

C. Register: A combination grille and damper assembly over an air opening.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For each model indicated, include the following:

a. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.

b. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.

c. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.

d. Assembly Drawing: For each type of air outlet and inlet: indicate materials and methods of assembly of components.

1.04 QUALITY ASSURANCE

A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated.

B. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of air-conditioning and Ventilating Systems."

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Diffusers, Registers, and Grilles:

a. None

B. Approved Manufacturers:

1. Diffusers, Registers, and Grilles:
    a. Titus (972-699-1030)
    b. Carnes (608-845-6411)
    c. Krueger (972-680-9136)

2.02 MANUFACTURED UNITS

A. Diffusers, Registers, and Grilles:
    1. As scheduled on Drawings

2.03 SOURCE QUALITY CONTROL

A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other item conflict with installation notify Owner’s Representative for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.03 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.04 CLEANING

A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION

SECTION 23 41 00 - PARTICULATE AIR FILTRATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Disposable Panel Filters
2. Extended Surface Filters

B. Related Sections:

1. Section 23 81 13.13 (15735) –Packaged Terminal Air-Conditioning Units
2. Section 23 xx xx (15xxx) – Fan Coil Units
3. Section 23 37 00 (15850) - Air Outlets and Inlets

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. Include dimensions; shipping, installed, and operating weights; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.

2. Maintenance Data: For each type of filter and rack to include in maintenance manuals specified in Division 01. Reference Section 01 78 23 (01830) “Operation and Maintenance Data” for additional requirements.

1.03 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air filters and are based on the specific system indicated.

B. Comply with NFPA 90A and NFPA 90B.

C. ASHRAE Compliance: Comply with provisions of ASHRAE 52.1 for method of testing and rating efficiency, arrestance, and dust holding capacity.

D. Underwriters Laboratories, Inc. (UL): Comply with UL Standards pertaining to safety and performance of air filter units including UL 900 “Test Performance of Air Filter Units.”

1.04 EXTRA MATERIALS

A. Furnish extra materials described in Section 01 78 43 (01790) “Spare Parts and Materials” that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Air Filters and Filter-Holding Systems:

a. None.

B. Approved Manufacturers:

1. Air Filters, Electrostatic Air Cleaners, and Filter-Holding Systems:

2. AAF International (800-477-1214)
3. Camfil Farr
4. International Air Filter, Inc. (800-797-1000)

2.02 DISPOSABLE PANEL FILTERS

A. Description: Factory-fabricated, viscous-coated, flat-panel type, disposable air filters with holding frames.

B. Media: Interlaced glass fibers sprayed with nonflammable adhesive.

C. Frame: Cardboard frame with perforated metal retainer.

D. Duct-Mounting Frames: Welded, galvanized steel with gaskets and fasteners and suitable for bolting together into built-up filter banks.

2.03 EXTENDED-SURFACE, DISPOSABLE PANEL FILTERS

A. Description: Factory-fabricated, dry, 1-inch or 2-inch extended-surface filters with holding frames.

B. Media: Fibrous material formed into deep-V-shaped pleats and held by self-supporting wire grid.

C. Media and Media-Grid Frame: Nonflammable rigid drip board frame with expanded metal support cross braced on both sides of filter media.

D. Media and Media-Grid Frame: Galvanized steel.

E. Duct-Mounting Frames: Welded, galvanized steel with gaskets and fasteners, and suitable for bolting together into built-up filter banks.

PART 3 EXECUTION

A. Install filter frames according to manufacturer's written instructions.

B. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.

C. Install filters in position to prevent passage of unfiltered air. Joints between filter frames and enclosing ductwork shall be gasketed and sealed against air leakages.

D. Coordinate filter installations with duct and air-handling unit installations.

3.02 CLEANING

A. After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, clean filter housings and install new filter media.

END OF SECTION

SECTION 22 51 00 - BREECHINGS, CHIMNEYS, AND STACKS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Type B Gas Vents.

B. Related Sections:

1. Section 07 92 00 (07920) - Joint Sealants
2. Section 07 84 00 (07840) - Firestopping
3. Section 23 05 00 (15050) – Common Work Results for HVAC

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. For each type of product indicated. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

2. Shop Drawings: Show fabrication and installation details for breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other Work. Detail assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, hangers and seismic restraints, and location and size of each field connection.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain Type B vent system components through one source from a single manufacturer.

B. Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for Fabricated Breechings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Type B Gas Vents:

a. None.

B. Approved Manufacturers:

1. Type B Gas Vents:

a. American Metal Group (800-423-4270)

b. Hart & Cooley, Inc. (800-433-6341)

c. Selkirk (800-992-8368)

2.02 TYPE B GAS VENTS

A. Description: Double-wall gas vents complying with NFPA 211, Type B. Inner pipe of sheet aluminum, outer pipe of galvanized-steel sheet, each with the following minimum thicknesses:

1. Round, 6-Inch and Smaller ID: 0.012-inch inner pipe, 0.0187-inch outer pipe.
2. Round, 7- to 18-Inch ID: 0.014-inch inner pipe, 0.0187-inch outer pipe.

B. Accessories: Tees, elbows, increasers, draft hood connectors, metal cap with bird barrier, adjustable roof flashing, storm collar, support assembly, thimbles, firestop spacers, and fasteners; fabricated of similar materials and designs as vent-pipe straight sections.

C. Provide and install cleanouts as required by local codes.

D. Terminate vents as shown and detailed on Drawings.

PART 3 EXECUTION

3.01 INSTALLATION OF MANUFACTURED BREECHINGS, CHIMNEYS, AND STACKS

A. Install according to manufacturer's written instructions. Locate to comply with minimum clearances from combustibles.

B. Install, support, and restrain according to requirements of seismic zone.

C. Seal between sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.

D. Support vents at intervals recommended by the manufacturer to support weight of vent and all accessories, without exceeding loading of appliances.

3.02 INSTALLATION OF DAMPERS

A. Install barometric operated dampers according to manufacturer's written instructions. Locate as close to draft hood collar as possible.

3.03 CLEANING

A. After completing system installation, including terminals, inspect exposed finishes. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean breechings internally, during and on completion of installation, to remove dust and debris.

C. Provide temporary closures at ends of breechings and chimneys that are not completed or connected to equipment.

END OF SECTION

SECTION 23 63 13 - AIR-COOLED CONDENSERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Air Cooled Condensers

B. Related Sections:

1. Section 03 30 00 (03300) - Cast-in-Place Concrete
2. Section 23 05 13 (15090) – Common Motor Requirements for HVAC Equipment
3. Section 23 05 93 (15950) - Testing, Adjusting and Balancing for HVAC
4. Section 23 54 00 (15530) - Refrigerant Piping: For valves and accessories for piping connections to units.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each model indicated.

2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection.

a. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

3. Maintenance Data: For each air-cooled condenser to include in the maintenance manuals specified in Division 01.

1.03 QUALITY ASSURANCE

A. Listing and Labeling: Provide equipment and accessories specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

B. Comply with NFPA 70.

1.04 COORDINATION

A. Coordinate size and location of concrete housekeeping bases. Cast anchor-bolt inserts into pad. Concrete, reinforcement, and formwork requirements are specified in Section 03 30 00 (03300) - "Cast-in-Place Concrete."

B. Coordinate locations for refrigerant piping and electrical rough-ins.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Carrier Corp.; Carrier Air Conditioning Division, United Technologies Corporation (800-827-7435 x 3496)
2. Trane, A Business of American Standard Companies (847-884-3296)

B. Approved Manufacturers:

1. Lennox International, Inc. (800-953-6669)

2.02 AIR COOLED CONDENSERS

A. Description: Factory assembled and tested; consisting of casing, condenser coils, condenser fans and motors, and unit controls; rated in accordance with ARI 210/240 and ANSI/UL 303/465/559.

B. Condensing Coil: Seamless copper-tube coil with mechanically bonded aluminum fins; factory tested at 425 psig. Circuit to match compressors seal with refrigerant holding charge

C. Condenser Fans and Drives: Propeller fans for vertical air discharge with fanguard; directly driven with permanently lubricated ball-bearing motors with integral current- and thermal-overload protection. Fans shall be statically and dynamically balanced.

1. Low Ambient Control: Factory-installed damper assembly, fan-speed control, or fan-cycling control.

2. Anti-Cycling Timer: 5 minute fixed off time to prevent short-cycling.

D. Operating and Safety Controls: Include condenser fan motor thermal and overload cutouts; 115-V control transformer, if required; magnetic contactors for condenser fan motors and an un-fused factory-mounted and -wired disconnect switch for single external electrical power connection. Mount controls in weatherproof panels.

E. Unit Casings: Steel, galvanized or zinc coated, for exposed casing surfaces, treated and finished with manufacturer's standard paint coating, designed for outdoor installation with weather protection for components and controls, and with removable panels for access to controls, condenser fans, motors, and drives.

F. Performance rating: EER and COP not less than prescribed by ANSI/ASHRAE-90A.

G. Coil Guard: PVC coated steel wireguard.

2.03 MOTORS

A. Refer to Section 23 05 13 (15090) - "Common Motor Requirements for HVAC Equipment" for general requirements for factory-installed motors.

B. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.

2.04 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate air cooled condensers according to ARI 210/240.

B. Testing Requirements: Factory test sound-power-level ratings according to ARI 270.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install air-cooled condensers according to manufacturer's written instructions.

B. Install units level and plumb, according to manufacturer's written instructions, Shop Drawings, original design, and referenced standards.

C. Install ground-mounted units on 4-inch thick, reinforced concrete base, 4 inches larger than condenser unit on each side. Concrete, reinforcement, and formwork requirements are specified in Division 03. Coordinate installation of anchoring devices.

3.02 CONNECTIONS

A. Install piping adjacent to machine to allow service and maintenance; minimum 4’-0” clearance on all sides.

B. Refrigerant Piping: Comply with applicable requirements of Section 22 54 00 (15530) "Refrigerant Piping." Connect piping to unit with service valve, filter dryer, and moisture indicator on each refrigerant-circuit liquid line.

C. Electrical: Comply with applicable requirements in Division 16.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

A. Leak Test: After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks and replace lost refrigerant and oil.

B. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units with new units and retest.

3.04 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Clean to remove burrs and construction debris and repair damaged finishes.

3.05 COMMISSIONING

A. Verify that units are installed and connected according to the Contract Documents.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for physical damage to unit casing.

2. Verify that access doors move freely and are weathertight.

3. Clean units and inspect for construction debris.

4. Check that all bolts and screws are tight.

5. Adjust vibration isolation and flexible connections.

6. Verify that controls are connected and operational.

C. Lubricate bearings on fans.

D. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.

E. Start unit according to manufacturer's written instructions.

1. Complete manufacturer's starting checklist.

F. Measure and record airflow over coils.

G. Check operation of low ambient control device.

H. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

I. After startup and performance test, lubricate bearings and adjust belt tension.

3.06 DEMONSTRATION

A. Startup Services: Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:

1. Conduct training as specified in Section 01 79 00 (01820) "Training".
2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

END OF SECTION

SECTION 23 73 33.13 - SINGLE ZONE ROOFTOP UNITS (100% OUTSIDE AIR)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Single Zone VAV Rooftop Units.
2. Motors
3. Quality Control

B. Related Sections:

1. Section 23 05 00 (15050) – Common Work Results for HVAC
2. Section 23 05 53 (15075) – Identification for HVAC Piping and Equipment
3. Section 23 05 13 (15090) – Common Motor Requirements for HVAC Equipment
4. Section 23 05 93 (15950) - Testing, Adjusting, and Balancing for HVAC
5. Section 26 29 13 (16420) - Enclosed Controllers: For motor starters.

1.02 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base air ratings on actual site elevations.

B. Operating Limits: Classify according to AMCA 99.

C. Rooftop Unit Schedule: The following information is described in an equipment schedule on the Drawings.

1. Fan performance data including capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
2. Fan arrangement including wheel configuration, inlet and discharge configurations, and required accessories.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data including rated capacities of each unit, weights (shipping, installed, and operating), furnished specialties, accessories, and the following:
   a. Certified unit performance curves with system operating conditions indicated.
   b. Certified unit sound power ratings.
   c. Motor ratings and electrical characteristics plus motor and electrical accessories.
   d. Material gages and finishes, including color charts.
   e. Dampers, including housings, linkages, and operators.
2. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.
3. Wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.
4. Maintenance data for power ventilators to include in the operation and maintenance manual specified in Division 01 and in Section 23 05 00 "Common Work Results for HVAC."

1.04 QUALITY ASSURANCE

A. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.

B. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

C. AMCA Compliance: Provide products that meet performance requirements and are licensed to use the AMCA Seal.

D. NEMA Compliance: Provide components required as part of fans that comply with applicable NEMA standards.

E. UL Standard: Provide power ventilators that comply with UL 705.

1.05 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements. Verify clearances.

B. Do not operate fans until ductwork is clean, filters are in place, bearings are lubricated, and fans have been commissioned.

1.06 COORDINATION AND SCHEDULING

A. Coordinate the size and location of structural steel support members.

B. Coordinate the installation of roof curbs, equipment supports, and roof penetrations. Roof specialties are specified in Division 07 Sections.

1.07 EXTRA MATERIALS

A. Furnish extra materials described in Section 01 78 43 (01790) “Spare Parts and Materials” that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Single Zone VAV Rooftop Units:

a. None.

B. Approved Manufacturers:

1. Single Zone VAV Rooftop Units:

a. Trane

b. Carrier

c. York

d. Aaon

2.02 Manufacturer:

A. Unit shall be Aaon, Model RN. The unit shall include packaged DDC controls and shall be arranged for operation with 100% outside air. The unit shall include all feature/options to accomplish this, including the specified capacity, key features and options. Unit shall produce the specified capacity per the scheduled data. The unit shall bear the ARI certification label as applicable.

2.03 See the attached sketches for unit size and capacity.

2.04 Unit shall be specifically designed for exterior application with a fully weatherproof cabinet. Exterior panels shall be constructed of 18 gauge galvanized steel. Hinged access doors shall be provided for access to compressor, controls, filters, blower, and other items that need periodic checking or maintenance. Access doors shall have quarter-turn latches. Door fastening screws are not acceptable.

Exterior surfaces shall be painted with acrylic-epoxy paint over a wash primer and a paint lock type galvanized steel.

Unit shall be completely insulated with minimum one inch thick neoprene coated glass fiber secured to side, top, bottom and end panels with adhesive and mechanical fasteners. Lifting brackets with lifting holes shall be provided on the unit base to accept cable or chain hooks.

2.05 Compressors shall be heavy duty, reciprocating, hermetic type with reversible, positive displacement oil pump, suction and discharge line service valves, crankcase heater and inherent solid state thermal overload protection. Compressor shall have its own completely independent refrigeration circuit including sight glass, filter-drier, manual shutoff valve and spring-type high pressure relief valve. Compressor shall be isolated on neoprene impregnated fiberglass kinetic blocks. Compressor capacity reduction shall be accomplished with option cylinder unloading, and hot gas bypass. The unit shall be equipped with a liquid line sight glass and shall be provided with a five minute anti-short cycle timer for each compressor.

2.06 Condenser coil shall be seamless copper tubing mechanically bonded to aluminum fins. Condenser coil shall provide for a minimum of 10 degrees of subcooling. Condenser fan shall be direct drive, propeller type designed for low tip speed and vertical air discharge. Condenser fan motor shall be heavy duty, inherently protected, three phase non-reversing type with permanently lubricated ball bearings and integral rain shield.

2.07 Evaporator coil shall be seamless copper tubing mechanically bonded to aluminum fins. The evaporator coil circuiting shall be fed with an adjustable thermal expansion valve with an external equalizer. A primary drain pan shall be provided with the cooling coil and extend beyond the leaving side of the coil and underneath the cooling coil connections. The drain pan shall be connected backward incline to a threaded drain connection extended through the unit base

2.08 Supply fan shall be backward incline, double width, double inlet centrifugal design. The fan shall be statically and dynamically balanced. The backward incline fan wheel and housing shall be fabricated from painted cold rolled steel. Fan motors shall be heavy duty, 1750 RPM, open drip-proof high efficiency type with relubricative ball bearings. Motor shall be high efficiency type equal to Baldor Premium Efficiency type meeting Ohio Energy Code and have 1.15 service factor. The motor shall have a variable pitch sheave (1.25 drive service factor) and an adjustable base for proper alignment and belt tension adjustment. The entire fan assembly shall be completely isolated from the unit bulkhead with neoprene gasketing and mounted on double deflection rubber-in-shear or spring isolators.

A. When the system is completely air balanced, the unit manufacturer shall furnish solid motor and/or fan sheaves and belts of the proper size to drive the fan at the required final speed. Sheaves shall be installed by the HVAC Contractor and the Balance Subcontractor shall adjust the airflow after the sheave change is complete.

B. The exhaust fan shall be backward inclined type. Fans and motors shall be dynamically balanced. A backdraft damper shall be provided with the exhaust fan. The backward incline fan wheel and housing shall be fabricated from painted cold rolled steel. Fan motors shall be heavy duty, 1750 RPM, open drip-proof high efficiency type with relubricative ball bearings. Motor shall be high efficiency type equal to Baldor Premium Efficiency type meeting Ohio Energy Code and have 1.15 service factor. The motor shall have a variable pitch sheave (1.25 drive service factor) and an adjustable base for proper alignment and belt tension adjustment. The entire fan assembly shall be completely isolated from the unit bulkhead with neoprene gasketing and mounted on double deflection rubber-in-shear or spring isolators. Motors shall be rated for use with variable frequency drives.

2.09 The unit shall be provided with a natural gas heating furnace consisting of a 409 stainless steel tubular heat exchanger, an induced draft blower and an electric pressure switch to lockout the gas valve until the combustion chamber is purged and combustion airflow is established.

A. The unit shall be provided with a gas ignition system consisting of an electronic ignitor to a pilot system which will be continuous when the heater is operating but will shut off the pilot when heating is not required. The unit shall heat using natural gas fuel with a 15:1 turndown burner.

B. The tubular gas heat exchanger shall have a ten(10) year warranty.

2.10 The unit shall be furnished with a filter section. Filter sections shall be supplied complete with galvanized steel filter racks as an integral part of the unit. Filters shall be accessible from both sides of the unit.

A. The pre-filter section shall accept 4-inch thick 85% efficient throwaway filters mounted in a galvanized steel filter frame. Filters shall be Farr or Flanders.

B. The unit manufacturer shall provide two (2) complete set of filters. Install one set of filters in unit when construction is complete. Furnish the other set as a spare to the Hospital when the project is complete. Provide temporary filters for use during construction.

2.11 The unit shall be provided with a heat wheal section. Heat wheel shall be “total energy” type for both sensible and latent energy recovery.

2.12 The unit shall be wired and tested at the factory before shipment. Wiring shall comply with NEC requirements and shall conform to all applicable U.L. Standards. All wiring shall be number coded per the electrical wiring diagrams. All electrical components shall be labeled according to the electrical diagram and be U.L. recognized where applicable. The unit shall have a 115 volt control circuit transformer.

The supply and return air fan, compressor and condenser fan motor branch circuits shall be individually fused. Contactors and inherent thermal overload protection shall be furnished for each compressor and condenser fan motor. The supply air fan motor shall have contactors and external overload protection. Main control panel shall be of weatherproof construction with a dead-front cover over the main power circuit controls.

A single fused disconnect shall be provided for the main power connection and a terminal board shall be provided for the low voltage control wiring. Knockouts shall be provided in the bottom of the main control panel for field wiring entrance. A separate key-locked control panel shall house all controls for the condensing section.

2.13 The compressor circuit shall include a liquid line solenoid valve, oil pressure switch, high pressure switch, low pressure switch, compressor control circuit switch and pumpdown switch. The refrigeration circuit shall have at least one condenser fan controlled from an ambient thermostat for positive head pressure control. An ambient thermostat shall prevent the refrigeration system from operating below 50°F.

2.14 Hot gas bypass control shall be factory installed on compressor circuits to provide capacity control by artificially loading the evaporator. Hot gas bypass control includes a solenoid valve, hot gas

bypass piping, and a hot gas bypass valve. The hot gas bypass valve shall be sized to modulate the full load.

2.15 The unit shall be provided with a factory piped hot gas reheat coil for dehumidification control. The hot gas reheat coil shall be provided with a modulating hot gas reheat control valve piped to the lead refrigerant system.

2.16 Fan ratings shall be AMCA Certified and fans shall bear AMCA seals.

2.17 A factory mounted variable frequency (VFD) drive shall be provided for the supply and return fans. The VFDs shall be a PWM type using IGTB output technology. The VFDs shall be an integral part of the rooftop unit control system, factory mounted and wired. The VFDs will be used for the air balancing purposes only. After air balancing is complete, the unit will operate as a constant volume system. Provide a manual bypass for each drive.

2.18 Controls

A. Unit Controller

1. The DDC controller shall be supplied and mounted and wired by unit manufacturer. Manufacturer shall include a single laminated wiring diagram in a ladder and point-to-point multi-color format, including the DDC controls, and adhered to the control cabinet door. The system shall be capable of operating as described in the sequence of operation.

2. The make up air unit programmable controller shall be internal to the rooftop unit and shall include a 7 day, 2 events per day scheduler, 14 day holiday schedule, optimal start and outputs for heating, cooling, economizer. The outside air temperature and the humidity sensors shall be factory mounted. The unit manufacturer shall provide the supply air temperature sensor for field installation by others.

B. Sequence of Operation

1. Unit shall operate with factory mounted DDC controls. The controls shall be by the unit manufacturer. The rooftop unit shall be controlled and started automatically through the DDC based on an occupancy schedule. Schedule shall be defined by the owner. The control sequence shall be developed by the rooftop unit manufacturer and programmed by the BAS Contractor.

2. Unit shall operate to control discharge air temperature and humidity. The supply and return fans shall operate continuously. On a call for space cooling, the unit's refrigeration controls shall operate to maintain discharge air temperature. On a call for dehumidification, the unit refrigeration equipment shall operate to satisfy discharge air humidity conditions. The gas burner shall operate to provide heat when the discharge air temperature falls below the set point. The gas burner shall be the first stage.

3. The unit controllers shall control the operation of the unit return fan. An end switch shall be furnished on the outside air dampers. The fan shall not be permitted to operate until the damper is open.

4. The unit shall be furnished with a humidity sensor and the controls shall determine if dehumidification is required. If the humidity is above the high limit, a maximum cooling demand shall be initiated to counteract the humidity. Stages of cooling will be added as required to lower the humidity below the high humidity limit. The electric reheat coils in the CAV boxes shall be modulated to control the space temperature.

5. A low limit thermostat shall be provided with the unit. The thermostat shall close the outside air damper and send an alarm if the supply temperature drops below the 45°F. This thermostat shall have a manual reset.

2.19 ampers shall be provided for the outside air intake section and exhaust section. Dampers shall be motorized low leakage type. The dampers shall be provided with an end switch to prevent fan operation unless the damper is proven open.

A. Dampers shall be equal to Ruskin Model CD-50. Dampers to be opposed blade, low leakage type and shall be single or multiple blade as required. Dampers and operators shall be furnished and installed by the air handling unit manufacturer. Dampers to be provided with internal motor mounts, suitable for operation with pneumatic operators. Electric operators furnished by the Building Automation System Contractor. Provide internal motor mount for each individual damper section. Damper sections not to exceed 48" x 48".

B. Dampers shall be guaranteed to limit leakage to 6 CFM per square foot when closing against 4" W.G. static pressure. Provide "equal percentage" or "linear" linkage as required.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements of installation tolerances and other conditions affecting performance of the power ventilators. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install rooftop units according to manufacturer's written instructions.

B. Support units using the vibration-control devices indicated. Vibration-control devices are specified in Section 23 05 48 - "Vibration, and Seismic Control for HVAC Piping and Equipment."

1. Secure roof-mounted equipment to roof curbs with cadmium-plated hardware.

a. Installation of roof curbs is specified in Division 07 Sections.

2. Suspend units from structural steel support frame using threaded steel rods and vibration isolation springs.

3. Ceiling Units: Suspend units from structure using steel wire or metal straps.

C. Install units with clearances for service and maintenance.

D. Label units according to requirements specified in Section 23 05 53 "Identification for HVAC Piping and Equipment."

3.03 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

B. Electrical: Conform to applicable requirements in Division 16 Sections.

C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly of components and installation of fans, including duct and electrical connections, and to report results in writing.

3.05 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Lubricate bearings.

D. Confirm refrigerant and oil charges and operating pressures.

E. Clean and comb all coils.

F. Pipe condensation drains.

3.06 CLEANING

A. After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

B. Clean Unit interiors to remove foreign material and construction debris. Vacuum clean fan wheel and cabinet.

3.07 COMMISSIONING

A. Final Checks before Startup: Perform the following operations and checks before startup:

1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections for piping, ducts, and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnects.

3. Perform cleaning and adjusting specified in this Section.

4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.

5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.

6. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in the fully open position.

7. Disable automatic temperature-control operators.

B. Starting procedures for fans are as follows:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.

2. Measure and record motor voltage and amperage.

C. Shut unit down and reconnect automatic temperature-control operators.

D. Refer to Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for procedures for air-handling-system testing, adjusting, and balancing.

E. Replace fan and motor pulleys as required to achieve design conditions.

3.08 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

1. Conduct training as specified in Section 01 79 00 (01820) "Training".

2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive.

END OF SECTION

SECTION 23 81 13.13 - PACKAGED TERMINAL AIR-CONDITIONING UNITS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Packaged Terminal Air Conditioning Units (PTAC)
2. Controls

B. Related Sections:

1. Section 07 92 00 (07920) - Joint Sealants
2. Section 23 09 00 (15900) - HVAC Instrumentation and Controls

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:
   a. Include rated capacities, weights, furnished specialties, and accessories for each model indicated.
2. Shop Drawings: Detail layout and installation of wall penetrations.
   a. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.
3. Maintenance Data: For equipment to include in the maintenance manuals specified in Section 01 78 23 (01830), “Operation and Maintenance Data.”
4. Warranties: Special warranties specified in this Section.

1.03 QUALITY ASSURANCE

A. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

B. Energy Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

C. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

D. Unit shall be tested for conformance to ASTM 331-00 water infiltration specification.

E. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled by UL and cUL.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
2. Unit shall be rated in accordance with ARI Standard 310/380-93 and certified by

1.04 COORDINATION

A. Coordinate layout and installation of units and wall construction where unit penetrates wall or is supported by it.

1.05 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: A written warranty, executed by the manufacturer and signed by the Contractor, agreeing to replace components that fail in materials or workmanship within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.

1. Full 1-year Warranty: During the first year after date of substantial completion and start-up, the manufacturer will repair or replace any parts which are defective in material or workmanship.

Sealed Refrigeration System: Manufacturers standard extended warranty, but not less than four years after date of Substantial Completion.

a. Provide free of charge, on-site repair or replacement of the compressor, condenser, evaporator or connecting tubing if defective in material or workmanship. This shall include system refrigeration charge.

Non-Sealed Refrigeration System: Manufacturers standard extended warranty, but not less than five years after date of Substantial Completion.

b. Provide free of charge, on-site repair or replacement of any non-sealed system part (motor, solenoid, thermistor, thermostat, relays, switch, capacitor, overload, drain valve, bulb heater, fan, stator) if defective in material or workmanship. The replacement part may be new or a remanufactured part. The limited warranty excludes labor including the cost of diagnostics, removal, and reinstallation necessary to accomplish the repair.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

a. None

B. Approved Manufacturers:

1. General Electric Company (800-770-4651)

a. "Zoneline Series 6100" (Heat Pump Unit with Electric Heat with 12.7 EER / 3.8 COP)

2. Amana Heating and Air Conditioning (800-6472982)

a. "Amana Series PTH" (Heat Pump Unit with Electric Heat with 11.7 EER / 3.3 COP)

3. LG Electronics (614-486-0358)

a. "LG Series LP" (Heat Pump Unit with Electric Heat with 11.6 EER / 3.4 COP)

2.02 PACKAGED TERMINAL AIR CONDITIONING UNITS (PTAC)

A. Description: Packaged, self-contained, through-the-wall terminal units with room cabinet, electric refrigeration system, heat pump and electric heating, and temperature controls; fully charged with refrigerant (R-410A).

B. Cabinet: Provide removable front panel with concealed latches.

1. Mounting: Wall with wall sleeve.

2. Finish: Manufacturer's standard color.
3. Control Knobs: If provided, shall be secured so that they can not be easily removed (anti-theft knobs).
4. Discharge Grille and Access Door: Provide discharge grille with hinged door in top of cabinet for easy access to controls. Hinged door not required if unit has unit or wall mounted digital controls.
5. Subbase: Enameled steel with adjustable leveling feet and adjustable end plates. Color to be white.
6. Wall Sleeves: Heavy duty, insulated, galvanized steel.
7. Louvers: Provided by window manufacturer.

C. Refrigeration System: Direct-expansion indoor coil with capillary restrictor, hermetically sealed compressor with internal spring isolation, external isolation, permanent-split-capacitor motor, and overload protection. Include the following:
1. Outdoor coil and fan.
2. Accumulator.

D. Preventative Maintenance: Split outdoor fan shroud for easy access to outdoor coil for cleaning and maintenance.

E. Air System: Forward or backward curved, centrifugal, indoor fans with two speed TEFC permanently lubricated permanent-split-capacitor motor, permanent one or two-piece interchangeable polyurethane washable filters, return air indoor filters and outdoor vent filter with concealed operation located under the front panel to manually open and close the outdoor vent.
1. Curtain Deflector: Manufacturers standard curtain deflector to insure the curtains will not blow into the discharge air stream.

F. Electric-Resistance Heating Coil: Nickel-chromium wire, electric-resistance heating elements with contactor and high-temperature-limit switch.

G. Condensate Drain: Slinger Technology used to pick up/disperse condensate to outdoor coil for re-evaporation. In addition, provide auxiliary condensate drain kits for connection to piped condensate drain system to a code approved location..

H. Outdoor Fan: Propeller type with corrosion resistant finish.

I. Coils: Aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed.

J. Electrical Requirements: 208 volt, pre-wired UL approved length power cord with one NEMA 6 (208/230 VAC) plug to use with wall receptacle.

K. Insulated Wall Sleeve::
1. Provide a heavy duty metal wall sleeve with factory installed insulation.

2.03 CONTROLS

A. Control Module:
1. Unit Mounted Controls: Unit-mounted adjustable thermostat, off-heat-cool mode switch, and fan cycle/continuous switch.
2. Wall Thermostat Controls: Wall thermostat interface with user selectable hi/low fan speed switch.
a. PTAC units to be controlled by an EMS system as furnished and installed by INNCOMM. INNCOMM scope to be included in HVAC contractors scope.

B. Low Ambient Lockout Control: Prevents cooling cycle operation below 55 deg F ambient outdoor temperature.

2.04 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Factory test to comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

B. Unit Performance Ratings: Factory test to comply with ARI 310/380, "Packaged Terminal Air-Conditioners and Heat Pumps."

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units according to manufacturer's written instructions.

B. Coordinate installation of wall sleeves in finished wall assembly; seal and weatherproof.

C. Install accessory Molding trim kit to hide any imperfections in wall around wall sleeve.

3.02 CONNECTIONS

A. Electrical: Connect units to wiring systems and to ground as indicated and instructed by manufacturer.

B. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

3.04 COMMISSIONING

A. After installation, check the following:

1. Unit is level on base and is flashed in exterior wall.
2. Unit casing has no visible damage.
3. Compressor, air-cooled condenser coil, and fans have no visible damage.
4. Set outdoor air vent damper to “open” position.
5. Condenser are clean and free of construction debris.
6. Controls are connected and operable, cycle unit through hi/lo fan and heat/cool operation.
7. Shipping bolts, blocks, and tie-down straps are removed.
8. Return air and outdoor vent air filters are installed and clean.
9. Drain pan and slinger ring are functioning properly.
10. Effectively disable the temperature limiter stops.

B. Check fan-wheel rotation (evaporator and condenser) for correct direction without vibration and binding.

C. Start unit according to manufacturer's written instructions.

1. Complete manufacturer's startup checks.

D. After starting and performance test, clean filters.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel.

1. Conduct training as specified in Section 01 79 00 "Training".

2. Train Owner's maintenance personnel on procedures for starting and stopping troubleshooting, servicing, and maintaining equipment.

3.06 Spare Parts

A. Furnish four (4) addition PTAC unit chassis to be used as spares.

END OF SECTION

SECTION 23 81 26 - SPLIT SYSTEM AIR-CONDITIONING UNITS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes

1. Split System air-conditioning units with fans, dx cooling and electric heating coils and controls, intended for indoor installations, with:

a. Externally Mounted Air-Cooled Condensing Units

B. Related Sections:

1. Section 23 05 48 (15070) – Vibration and Seismic Control for HVAC Piping and Equipment: For isolation pads, spring isolators, and seismic restraints.

2. Section 23 09 93 (15940) - Sequence of Operations for HVAC Equipment: For control sequences affecting operation of units.

3. Section 23 05 93 (15950) - Testing, Adjusting and Balancing for HVAC.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each type of product indicated.

2. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

3. Maintenance Data: For self-contained air-conditioning units to include in maintenance manuals specified in Division 01.

4. Warranties: Special warranties specified in this Section.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. System shall comply with requirements of ARI 410, AMCA 210, ASHRAE 15.

1.04 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of self-contained air-conditioning units that fail in materials or workmanship within specified warranty period.

C. Warranty Period: Five years from date of Substantial Completion. Response time within 8 hours must be available 7 days per week.

1.05 EXTRA MATERIALS

A. Furnish extra materials described in Section 07 19 00 (01790) “Spare Parts and Materials” that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Remote Air-Cooled, Self-Contained Air-Conditioning Units:

a. None.

B. Approved Manufacturers:

1. Split System Air-Conditioning Units:

a. Trane, A Business of American Standard Companies (847-884-3296)

b. Carrier Corp.; Carrier Air Conditioning Division, United Technologies Corporation (800-827-7435 x 3496).

c. Lennox Industries Inc. (800-953-6669).

2.02 SPLIT SYSTEM UNITS

A. Description: Factory-assembled and -wired unit; consisting of cabinet, evaporator fan, evaporator coil, electric heating coil air filters, and controls;. See schedule on mechanical drawings for additional information.

1. Condensing Unit: Remote air-cooled condensing unit.

B. Disconnect Switch: Factory mounted on equipment.

2.03 CABINET

A. Cabinets shall be manufactured of heavy gauge galvanized steel. The interior of the cabinets shall be completely insulated with a minimum of ½” insulation for thermal and acoustical treatment. Insulation: Minimum 1-inch thick, 1 ½ Lb/Ft 3 density fiberglass neoprene coated acoustic duct liner on cabinet interior and control panel.

B. Drain Pan: Galvanized steel with corrosion-resistant coating.

2.04 EVAPORATOR FAN

A. Blower wheels shall be centrifugal, forward curved, direct drive type and dynamically balanced for smooth, quiet operation. Motors shall be 4 or 5-speed (via motor taps) permanent split capacitor type with built-in overload protection and sleeve bearings. Units shall be selected to provide the scheduled external static pressure (external static pressure does not include evaproator coil pressure drop). Motors: Multi-speed, PSC type.

2.05 EVAPORATOR COIL

A. Evaporator coils shall be direct expansion type designed for application with the air handling units and shall be matched with the outdoor condensing units. Coils shall be shipped separately for field installation in either the left or right side of the cabinet. All coils shall have 3/8” OD copper tubes mechanically bonded to high efficiency aluminum fins. Each coil shall be factory tested at 350 psig. Coils shall be leak tested, dehydrated and shipped with a refrigerant or helium holding charge.Refrigeration Circuit: A separate circuit for each compressor, with externally equalized thermal-expansion valve, filter-dryer, and charging valves.

2.06 REMOTE AIR-COOLED CONDENSER

A. See Section 22 63 13 (15672) “Air Cooled Condensers”.

2.07 HEATING COIL

A. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for over-current protection.

2.08 AIR FILTERS

A. Disposable Filters: 2-inch thick, glass-fiber, pleated panel filters.

2.09 CONTROLS

A. Control Package: Factory wired, including contactor, high- and low-pressure cutouts, internal-winding thermostat for compressor, control-circuit transformer, and non-cycling reset relay.

B. Time-Delay Relay: Five-minute delay to prevent compressor cycling.

C. Adjustable Digital Thermostat: Remote with securable blank cover in public spaces (except meeting rooms) and locking ventilated cover to control the following:

1. Supply Fan
2. Compressor
3. Condenser
4. Electric Heater
5. Plastic guards are not acceptable.

D. System Selector Switch: Off-Heat-Auto-Cool

E. Fan Control Switch: Auto-On

F. Voltage and Phase Monitoring

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units level and plumb.

B. Anchor units to structure.

C. Isolation: Mount cabinet and remote air-cooled condenser on rubber-in-shear pads for mounting under base of unit.

D. Install seismic restraints (where required).

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to unit to allow service and maintenance.

C. Unless otherwise indicated, connect piping with unions and shutoff valves to allow units to be disconnected without draining piping. Refer to piping system Sections for specific valve and specialty arrangements.

D. Ground equipment:

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

A. Installation Inspection: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to prepare a written report of inspection.

B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new components, and retest.

D. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.04 COMMISSIONING

A. Verify that units are installed and connected according to the Contract Documents.

B. Lubricate bearings, adjust belt tension, and change filters.

C. Perform startup checks according to manufacturer's written instructions and do the following:

1. Fill out manufacturer's checklists.
2. Check for unobstructed airflow over coils.
3. Check operation of condenser capacity-control device.
4. Verify that vibration isolation devices and flexible connectors dampen vibration transmission to structure.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

1. Conduct training as specified in Section 01 79 00 (01820) "Training".
2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining units.

END OF SECTION

SECTION 23 82 39 - UNIT HEATERS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Unit Heaters.
2. Cabinet Unit Heaters.

B. Related Sections:

1. Section 23 05 00 (15050) – Common Work Results for HVAC
2. Division 26 (16) Sections for electrical connections.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product data for each type of product specified.
2. Wiring diagrams detailing power and control wiring and differentiating clearly between manufacturer-installed wiring and field-installed wiring.
3. Samples of cabinet finish colors for approval.
4. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Owner’s Representatives and owners, and other information specified.
5. Field test reports from a qualified independent inspecting and testing agency indicating and interpreting test results relative to compliance with performance requirements of unit heaters.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm experienced in manufacturing unit heaters similar to those indicated for this Project and that have a record of successful in-service performance.

B. Comply with NFPA 70 for components and installation.

C. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None

B. Approved Manufacturers:

1. Indeeco (800-243-8162)
2. Emerson Electric Co. (314-553-2000)
3. QMark, Marley Engineered Products, An SPX Company (843-479-4006)
4. Markel Products Company (800-682-3398)

2.02 ELECTRICAL UNIT HEATERS

A. Heating Elements: Nickel-chromium heating wire element; free from expansion noise and 60-Hz hum; embedded in magnesium oxide, insulating refractory; and sealed in high-mass steel or corrosion-resistant metallic sheath with fins no closer than 0.16 inch. Element ends are enclosed in terminal box. Fin surface temperature does not exceed 550 deg F at any point during normal operation.

B. Heater Circuit Protection: One-time fuses in terminal box for overcurrent protection and limit controls for overtemperature protection of heaters.

C. Fan and Motor: Direct-drive propeller fan and manufacturer's standard motor. Motors sized 1 hp and less include motor overload protection.

D. Wiring Terminations: Match conductor materials and sizes indicated.

E. Discharge Configuration: Horizontal discharge with horizontal, adjustable louvers.

F. Optional Accessories: Include the following:

1. Wall thermostat.
2. Safety-switch disconnect on cover of terminal box.
3. Mercury contactors.
4. Fan-delay relay.

2.03 ELECTRICAL CABINET UNIT HEATERS

A. Description:

1. Semi-recessed, wall-mounted cabinet with front grille air inlet and front air outlet.

B. Heating Elements: Nickel-chromium heating wire element; free from expansion noise and 60-Hz hum; embedded in magnesium oxide, insulating refractory; and sealed in high-mass steel or corrosion-resistant metallic sheath with fins no closer than 0.16 inch (4 mm). Element ends are enclosed in terminal box. Fin surface temperature does not exceed 550 deg F (288 deg C) at any point during normal operation.

C. Heater Circuit Protection: One-time fuses in terminal box for over-current protection and limit controls for over-temperature protection of heaters.

D. Fan and Motor: Centrifugal blower, direct driven by a single-phase, 2-speed electric motor with inherent overload protection and resilient motor/fan mount.

E. Wiring Terminations: Match conductor materials and sizes indicated.

F. Unit Controls: Thermostat, fan-speed switch, fan ON-AUTOMATIC switch, interval timer, and outside air-damper control switch.

G. Optional Accessories: Include the following:

1. Integral thermostat.
2. Disconnect switch.
3. Mercury contactor.
4. Fan-delay relay.
5. Kickplate base for floor-mounted units.

H. Finish cabinet with manufacturer's standard enamel, color as selected by Owner’s Representative.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and supports to receive unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of units. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install heaters as indicated, according to manufacturer's written instructions and NFPA 90A.

B. Connect heaters and components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.

3.03 FIELD QUALITY CONTROL

A. Testing: After installing unit heaters and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

B. Remove and replace malfunctioning units with new units and retest.

3.04 CLEANING

A. Replace filters in each cabinet unit heater at project closeout.

END OF SECTION

SECTION 23 84 19 - POOL DEHUMIDIFICATION UNIT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pool Dehumidification Unit
2. Motors
3. Factory Finishes
4. Quality Control

B. Related Sections:

1. Section 23 05 00 (15050) – Common Work Results for HVAC
2. Section 23 05 53 (15075) – Identification for HVAC Piping and Equipment
3. Section 23 05 13 (15090) – Common Motor Requirements for HVAC Equipment
4. Section 23 05 93 (15950) - Testing, Adjusting, and Balancing for HVAC
5. Section 26 29 13 (16420) - Enclosed Controllers: For motor starters.

1.02 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base air ratings on actual site elevations.

B. Operating Limits: Classify according to AMCA 99.

C. Fan Schedule: The following information is described in an equipment schedule on the Drawings.

1. Fan performance data including capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
2. Fan arrangement including wheel configuration, inlet and discharge configurations, and required accessories.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data including rated capacities of each unit, weights (shipping, installed, and operating), furnished specialties, accessories, and the following:
   a. Certified fan performance curves with system operating conditions indicated.
   b. Certified fan sound power ratings.
   c. Motor ratings and electrical characteristics plus motor and electrical accessories.
   d. Material gages and finishes, including color charts.
   e. Dampers, including housings, linkages, and operators.
2. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.
3. Wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.

4. Maintenance data for power ventilators to include in the operation and maintenance manual specified in Division 01 and in Section 23 05 00 "Common Work Results for HVAC."

1.04 QUALITY ASSURANCE

A. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.

B. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

C. AMCA Compliance: Provide products that meet performance requirements and are licensed to use the AMCA Seal.

D. NEMA Compliance: Provide components required as part of fans that comply with applicable NEMA standards.

E. UL Standard: Provide power ventilators that comply with UL 705.

1.05 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements. Verify clearances.

B. Do not operate fans until ductwork is clean, filters are in place, bearings are lubricated, and fans have been commissioned.

1.06 COORDINATION AND SCHEDULING

A. Coordinate the size and location of structural steel support members.

B. Coordinate the installation of roof curbs, equipment supports, and roof penetrations. Roof specialties are specified in Division 07 Sections.

1.07 EXTRA MATERIALS

A. Furnish extra materials described in Section 01 78 43 (01790) “Spare Parts and Materials” that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers:

1. Centrifugal Roof Ventilators:

a. Desert Aire

b. Dectron

2.02 POOL DEHIMIDIFICATION UNIT

A. The unit dehumidifier shall be a heavy-duty, commercial / industrial grade, heat recovery dehumidification system. The system shall be completely assembled and factory tested. The unit shall include the following minimum parts and components: Compressor, evaporator (dehumidifier) coil, full-capacity condenser (hot gas reheat) coil, receiver, blower, blower motor, refrigeration valves, and electrical controls.

1. The system shall reject heat to the following additional condenser(s) with the corresponding purpose:

2. Provide space cooling with outdoor remote air- cooled condenser.

B. **Modes of Operation**: In the dehumidification process, air is passed through an evaporator coil where it is cooled below its dew point. As a result, condensate forms on the cool surface of the evaporator coil fins, accumulates in the drain pan below and is drained. The refrigerant in the evaporator coil absorbs the latent and sensible heat energy from the air. This heat energy along with the heat of compression is available to reject back into the air stream or remote air-cooled condenser as required by the system and designated by the controller.

C. **Sequence of Operation**: The dehumidifier shall maintain its moisture removal capacity in all modes of operation, as specified in the unit schedule. Controls shall automatically operate the dehumidification heat recovery system in response to system requirements and adjust its output to maintain specified conditions. The heat recovery unit shall be capable of rejecting the total heat of rejection (THR) to the air for space heating (reheat) or to a remote air-cooled outdoor condenser on a call for air cooling.

D. **Certified Rating**: The complete unit shall be certified according to ARI Standard 910 for moisture removal capacity and moisture removal efficiency. Non-certified units will not be acceptable.

E. **Submittals:** Submit the following technical and performance data: dimensions, capacities under all operating modes, data on all factory-supplied accessories, and warranty information. Submit supporting technical and performance data of the basis of the system design with the bid documents.

F. **Quality and Safety Assurance**: The complete unit shall be built and tested in the U.S.A. All parts and components shall be UL, ETL or ETLc listed. The manufacturer of the dehumidification system shall have a minimum of ten (10) years of experience in the production of these systems, including local reference installations.

G. **Installation and Operation Data**: An Installation and Operation manual shall be included with each unit, complete with the following minimum information: Start-up checklist, service and maintenance instruction, air balancing instruction, operation and control details, and power and control schematics.

2.03 Unit Description

A. **Enclosure**: The unit shall be fabricated per the following method: The base shall be U.S. 12-gauge Galvanneal steel; corner posts and side posts shall be formed U.S. 18-gauge Galvanneal steel; top panels and removable side panels shall be a minimum of U.S. 18-gauge Galvanneal steel. Removable panels shall be provided to allow easy access to all internal parts and components. The electrical control box and switch panel shall be enclosed in a separate compartment, complete with a hinged door.

B. **Paint and Finish**: Prior to painting, all metal parts shall be pretreated to remove oils and dirt and rinsed with an ionized solution. Painting shall be by a powder coat technique to assure positive adherence with a high-impact finish. All sides of panels shall be painted after manufacturing. The paint shall be High Yield Polyester. The paint shall be rated to meet a minimum of 1,000-hour salt spray test (ASTM B117), have a minimum Direct Impact Resistance of 160 in-lbs (ASTM D2794), have a minimum flexibility of ¼" Mandrel (ASTM D522, Method B) and a minimum 1000-hour Humidity Resistance (ASTM D2247). The unit color shall be Almond.

C. Refrigeration System:

1. Refrigerant: The system's operating refrigerant shall be R-22.

2. Compressor: The compressor shall be a heavy-duty, scroll, hermetic compressor. The compressor shall be equipped with low and high pressure safety switches, with internal protection from overheating. The compressor shall be externally vibration isolated.

3. Hot Gas Bypass: (Optional, required if entering air temperature (EAT) is < 75^{o}F), the unit shall include hot gas bypass for each system compressor set.

4. Receiver: The unit shall include a refrigerant receiver. The receiver shall assist the unit in operating at the highest efficiency over a wide range of load conditions.

5. Evaporator Dehumidifier Coils:

   a. Fins: Fins shall be die-formed, raised lanced aluminum, and be damage resistant. Extruded fin collars provide maximum heat transfer. Fin spacing shall be 12 fins per inch (FPI). The coil shall be a maximum of 30" in height.

   b. Tubes: Coil shall be fabricated from seamless drawn copper. The inner tubing shall be rifled to produce turbulent refrigeration flow to enhance the heat transfer process. The tubes shall be hydraulically expanded into the fins to form a permanent metal-to-metal bond for maximum heat transfer and stability.

   c. Coils shall be leak tested with 540 psig of nitrogen.

   d. Evaporator Bypass: Provide a fixed evaporator bypass opening to bypass a portion of the return air stream. After the evaporator has dehumidified its portion of the air stream, the mixing of the bypass and evaporator air shall result in a temperature above the space dew point temperature.

6. Refrigerant Condenser Coils:

   a. Air-Cooled Condenser (Reheat Coil):

      1) Fins: Fins shall be die-formed, raised lanced aluminum and shall be damage resistant. Fin spacing shall be 10-12 FPI (fins per inch).

      2) Tubes: Coil shall be fabricated from seamless drawn copper. The inner tubing shall be rifled to produce turbulent refrigeration flow to enhance the heat transfer process. The tubes shall be hydraulically expanded into the fins to form a permanent metal-to-metal bond for maximum heat transfer and stability.

      3) Coils shall be leak tested with 625 psig of nitrogen.

      4) The reheat coil shall be positioned with a minimum of 5" clearance from the evaporator coil to help prevent water re-evaporation.

   b. Remote Air-Cooled Condenser:

      1) The size and capacity shall be in accordance with the unit schedule. The system shall be able to reject all the recovered heat (THR) to the outdoor condenser.

      2) The unit shall be provided with a weatherproof electrical panel with factory mounted door interrupt disconnect switch.

      3) The cabinet shall be constructed of heavy-gauge aluminum. The sides shall be one-piece construction. The unit shall be provided with lifting eyes located on the fan discharge panel.

      4) The coil shall be constructed of copper tubing in a staggered design. Tubes shall be hydraulically expanded into full-collared, plate-type aluminum fins. Coils shall be factory leak-tested and sealed with caps.

      5) The fan motors shall be heavy-duty PSC or three-phase with permanently lubricated ball bearings and built-in overload protection. All motors shall be factory-wired with leads terminating in a weatherproof junction box located on the outside of the unit cabinet.

      6) The fan diameter shall not exceed 30". All units shall have a dynamically balanced fan with aluminum blades and painted steel hubs.

      7) The fans shall be cycled based on internal head pressure on multiple fan units.

      8)

9) Fan guards shall be heavy-gauge, closed-mesh steel wire with vinyl coating. Guards shall be contoured for maximum rigidity.

10) **ROCQ Quiet Series:** The condenser shall use a low 540 RPM motor combined with a specially designed fan blade to produce 62dbA or less noise @ 10 ft.

D. **ElectroFin E-Coating:** Coat the following coils with ElectroFin E-coating to resist chemicals and corrosion. The coating will be applied to the entire coil assembly. The coil will be sealed, electro-statically charged, coated and baked. Fin coating only applications will not be accepted.

1. Evaporator coil, hot gas reheat coil, and any airside fluid auxiliary heating coil shall be coated.

E. Auxiliary Heater

1. The electric heater capacity shall be in accordance with the unit schedule.

2. The heater shall be integral to the unit and wired to the units as a single point power connection. No external duct mount heaters are acceptable (see 3.4.1 which indicates External Heater is optional).

3. The heater coils shall be constructed of high grade nickel-chrome alloy and insulated by floating ceramic bushings from the galvanized steel frame. Coil terminal pins shall be stainless steel insulated by means of non-rotating ceramic bushings.

4. The heater shall be equipped with fail-safe disc-type thermal cut-outs.

5. The heater shall include high limit cut-outs, magnetic contactors as required, a control transformer, and an airflow switch.

F. **Outdoor Air**: The volume of code outdoor air shall be met as specified on the schedule. Exhaust air fan shall be external to the unit and supplied by others.

1. **Evaporator Bypass:** An automatic two-position evaporator bypass damper shall be provided. The bypass damper shall be located in fixed evaporator bypass opening. The damper shall be field-balanced to maintain constant evaporator airflow during unoccupied and occupied modes of operation.

2. **Unit Outdoor Air Duct Connection with Damper:** The unit shall be supplied with a duct connection opening for the introduction of outdoor air. The outdoor air shall be introduced after the evaporator coil but before the reheat condensing coil.

a. A two-position, spring-return damper and actuator shall be factory provided to allow the system to bring in outdoor air during occupied time periods and to close during unoccupied times.

b. The installing contractor shall provide a duct mounted filter rack with a 1” fiberglass disposable filter.

G. **Electrical Control Panel**: The electrical control panel shall be easily accessible. It shall be of adequate size to house all electrical controls and devices. The unit shall be provided with single point power connection to serve controls, fans, electric auxiliary heater, and compressors, factory wired to the power connection lug set. The electrical controls shall include low voltage transformers to supply 24 VAC control power, clearly labeled high- and low-voltage terminal strips, high- and low-pressure control (with manual reset of the high-pressure cutout and automatic reset of low-pressure cutout), and an anti-short-cycling timer to protect against compressor cycling.

H. **Control System**:

1. A digital control system shall be used to accurately and precisely control the DESERT AIRE dehumidification system and the space environment.

2. The controller shall provide precise system control and feature an easy-to-read display which indicates actual operating and set-points. The display shall be remote mountable up to 500 feet from the unit. The controller shall have a built-in occupancy timer.

    a. **Temperature Sensor**: The unit shall include a temperature sensor to be field-installed in the space or return air duct as specified.

    b. **Relative Humidity Sensor:** The unit shall include a relative humidity sensor to be field-installed in the space or return air duct as specified.

I. **Condensate Drain Pan**: The drain pan shall be 20-gauge stainless steel, sloped, and positioned under the dehumidifier coil. The drain pan shall be TIG welded and securely attached to the evaporator endplates to avoid shifting. The drain pan shall be fitted with a minimum 1" MPT non-corrosive plastic drain connection. The drain pan shall meet all the requirements of ASHRAE Standard 62.

J. **Insulation**: The thermal and sound insulation shall be engineered polymer closed-cell foam insulation (EPFI). Indoor units shall have 3/8" thick insulation and outdoor units shall have 3/4" thick insulation. The insulation meets the following requirements.

NFPA 255 Flame Spread - 25
NFPA 255 Smoke Developed - 50
NFPA 255 Fuel Contributed - 0
NFPA 90A (2-2.4.2) and 90B
ASTM C5118 (Thermal Resistance)
ASTM C411 (Hot Surface Performance)
ASTM C423 (Sound Absorption)
ASTM C665 (Fungi Resistance)
ASTM E90 (Airborne Sound Trans. Loss)
ASTM E96 (Water Vapor Transmission)
UL 94HBF (Horizontal Burn)
UL 181 (Air Erosion, Mold Growth, and Humidity)
ASTM C1136 (Mold, Mildew, and Moisture Resistance)

K. **Blower:** The blower housing shall be made of galvanized steel and mounted on permanently lubricated, sealed ball bearings. The blower assembly shall be forward curved, centrifugal; it shall be dynamically and statically balanced.

1. Blower Discharge: The unit's air discharge shall be as shown on the drawing.

2. Blower Pulley Assembly: The driver pulley and the blower pulley shall be made of cast iron. The motor sheave shall be a variable pitch type to allow for field adjustment of CFM and external static pressure, and be dynamically and statically balanced. The drive overload service factor shall be 1.3 minimum.

3. Blower Motor: The motor shall be or TEFC (exception is for the 7.5 HP motor shall be OPD for indoor unit), Class B insulated, continuous-duty, 40°C ambient with three-phase overloads.

L. Return Air Filters:

1. The system shall be provided with MERV 8 disposable filters consisting of 4" pleated filter.

M. **Warranty**: The unit shall be manufactured of the finest quality components. which are readily available as off-the-shelf replacement parts throughout North America. All components shall be warranted for a period of two (2) years from date of unit shipment. Although the warranty begins on the date of shipment, the manufacturer shall not replace any component without a valid start-up report on file. In addition, the manufacturer shall provide the following extended warranties:

1. Provide an extended 3-year compressor warranty for a combined warranty of 5-years.

2. Provide an extended 3-year warranty on airside coils with ElectroFin E-Coating for a combined warranty of 5-years.

N. **Approvals/Listings**: The unit shall be labeled and listed by ETL or UL. The dehumidification system performance shall be certified to meet ARI Standard 910.

2.04 MOTORS

A. Refer to Section 23 05 13 - "Common Motor Requirements for HVAC Equipment" for general requirements for factory-installed motors.

B. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.

C. Enclosure Type: The following features are required as indicated:

1. Open dripproof motors where satisfactorily housed or remotely located during operation.

2.05 FACTORY FINISHES

A. Sheet Metal Parts: Prime coat before final assembly.

B. Exterior Surfaces: Baked-enamel finish coat after assembly.

C. Aluminum Parts: No finish required.

2.06 SOURCE QUALITY CONTROL

A. Testing Requirements: The following factory tests are required as indicated:

1. Sound Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA Seal.

2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements of installation tolerances and other conditions affecting performance of the unit. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. **Preparation:** Installing contractor to provide all labor, refrigerant, and material required for a complete installation. (Minimum 3 feet clearance on all sides.) Work to be performed shall be in accord with local codes, regulations, and OSHA standards.

B. **Delivery, Storage, and Handling:** Customer to provide a suitable space for the equipment with proper access and entries. Unit to be stored in a clean, dry place and protected from the outdoor environment. Handle with care to avoid damage.

C. **Installation:** Unit shall be installed per plans and manufacturer's installation recommendations.

D. **Field Quality Control:** Installing contractor to clean, check, and perform all preliminary start-up procedures before final operation of the unit, per manufacturer's recommendations.

E. **Provide complete operation/maintenance manuals (in English) and include the following minimum lists:** electrical and control drawings, and refrigeration piping drawings. Manufacturer's representative shall instruct owners/operators of the unit regarding its functions and sequence of operation.

3.03 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

B. Electrical: Conform to applicable requirements in Division 16 Sections.

C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly of components and installation of fans, including duct and electrical connections, and to report results in writing.

3.05 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Lubricate bearings.

3.06 CLEANING

A. After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

B. Clean unit interiors to remove foreign material and construction debris. Vacuum clean unit cabinet.

3.07 COMMISSIONING

A. Final Checks before Startup: Perform the following operations and checks before startup:

1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections for piping, ducts, and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnects.

3. Perform cleaning and adjusting specified in this Section.

4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.

5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.

6. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in the fully open position.

7. Disable automatic temperature-control operators.

B. Starting procedures for fans are as follows:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.

2. Measure and record motor voltage and amperage.

C. Shut unit down and reconnect automatic temperature-control operators.

D. Refer to Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for procedures for air-handling-system testing, adjusting, and balancing.

E. Replace fan and motor pulleys as required to achieve design conditions.

3.08 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

1. Conduct training as specified in Section 01 79 00 (01820) "Training".

2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive.

END OF SECTION

CSI SECTION 255110

INTEGRATED ROOM AUTOMATION SYSTEM

This document defines and specifies an integrated room automation system using both wired and wireless modes of communication. The wireless communication required to control the system uses either of the following technologies:

- Diffusive infrared (IR) technology, which is immune to interference by fluorescent lighting and does not require direct line of sight for effective communication.
- Zigbee (RF) technology for both in-room and room-server communication.

This specification is provided in the format recommended by the Construction Specifications Institute (CSI).

PART 1 – GENERAL

1.1 SUMMARY

A. Provide a complete, integrated room automation system using wired technology for the following:

1. HVAC equipment.
2. Lighting.
3. Central interface (CI) server application.
4. Remote room monitoring and communications.
5. Privacy/Make Up Room (MUR) notification.

1.2 RELATED WORK

A. Examine contract documents for requirements that affect work of this section. Other Specification sections that relate directly to work of this section include, but are not limited to:

1. Division 23 – Heating, Ventilating, And Air Conditioning (HVAC)
2. Division 26 – Electrical; Power Wiring to System Hardware
3. Division 27 – Communications
4. Division 28 – Electronic Safety and Security

1.3 SUBMITTALS

A. Product Data: Submit the Manufacturer's product data and installation instructions for each component and system.

B. Shop Drawings: Submit list of components and equipment to be supplied, including proposed locations, clearances, and power requirements.

C. Operations and Maintenance Manual: Submit the Manufacturer’s standard operations and maintenance manual, including emergency maintenance provider.

D. Qualifications: Submit documentation from the Manufacturer and Installer indicating qualifications listed in Section 1.4, Quality Assurance.

E. Warranty: Submit the Manufacturer’s standard one-year labor and parts warranty for turnkey installation.

1.4 QUALITY ASSURANCE

A. Qualifications of Manufacturer: The Manufacturer shall have a minimum of 20 years documented experience manufacturing integrated room automation systems having similar or more stringent requirements than the system for the current project. The Manufacturer shall submit a list of at least 15 completed projects using similar integrated room automation systems.

B. Qualifications of Installer: Submit a letter signed by the Manufacturer stating that the Installer is licensed by or acceptable to the Manufacturer of the integrated room automation system.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened, factory-labeled packages. Store and handle in strict compliance with the Manufacturer's instructions and recommendations. Protect from damage. Sequence deliveries to avoid delays, but minimize on-site storage.

1.6 COORDINATION

A. Conference: Convene a pre-installation conference to establish procedures to coordinate this work with related and adjacent work.

B. Coordination: Furnish inserts and anchors that must be built into other work. Work closely with installers of finish materials so that units are properly aligned with adjacent materials.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturer: INNCOM International, Inc., 227 West Main Street, Niantic, CT. Telephone 860-739-4468, website www.inncom.com.

2.2 SYSTEM DESCRIPTION

A. HVAC Controls:

1. HVAC Type: The control strategy will be for PTAC units.

a. Packaged Terminal Air Conditioners (PTAC): The System shall control one PTAC in each room. The System shall directly control a 1-, 2-, or 3-speed, low-voltage interface. The System will also control the compressor and associated heating equipment. INNCOM will provide the PTAC Vendor with the necessary control card or connectors to be installed at point of manufacture or in the rooms. In case of existing PTAC’s, the same equipment can be installed in-place by trained personnel. The System shall provide automatic switchover from heating to cooling operation at each room.

2. HVAC Control Strategies: Provision shall be made to prevent the system from switching repeatedly from cooling to heating and back while attempting to maintain a constant target temperature. The System’s temperature-control performance shall meet the requirements defined below for proportional valves. The System’s humidity-refresh performance shall meet the requirements defined below.

a. Temperature Control: The System in the room shall employ a PID algorithm to minimize fan speed and valve changes and to reduce servo-loop error. Such error, measured as the temperature difference between the set target temperature and the measured room temperature, shall not exceed 1.0^{o} C under steady-state conditions and will automatically compensate for changes in the heat/cooling load of the room. The temperature control algorithm shall be capable of using the full resources of the FCU to maintain target temperature. Proportional-only algorithms that set the fan speed in proportion to the error shall not be accepted (as they cause a temperature control error that increases with the fan speed).

b. Humidity Refresh: The System in the room shall be capable of maintaining a maximum level of humidity. The refresh cycle will activate in unoccupied rooms only.

c. Humidity Refresh Cycle: The room air conditioning shall be activated on a pre-defined duty cycle to remove excess humidity. The System shall monitor, via central sensors or individual room sensors, the air temperature and relative humidity. When the relative humidity exceeds a preset threshold, the room AC shall be activated if the AC has been shut down for a period of time that exceeds a programmable time value (for example, if the AC has not run for the last one hour).

d. Fan Speed Control: Fan speed shall be selected automatically by the System to match the heat gain/loss in the room. Fixed-fan operation shall also be available to the guest. Fan speeds shall be field-programmable to allow limiting fan speeds to a desired range of speeds. For example, if the High-Fan of the FCU is objectionable to the guest due to the noise level it creates, the System shall be capable of being programmed on a room-by room basis to maintain Medium Fan speed and not enter into the High Fan speed under any condition. Fan operation shall be configurable to provide for “Continuous Fan” or “Automatic Fan.” Continuous Fan means that the fan shall run even when the target temperature has been satisfied. Automatic Fan means that the fan shall run only on active heating or cooling call.

e. Multiple HVAC Zone Rooms (Suites): The System shall be capable of supporting multi-zone rooms, where the rooms are not separated by a door, yet each room has multiple HVAC units. The System shall be able to link the thermostats and bedside panel (if provided) in these rooms so that they track. This prevents having one room call for heat while the other is calling for cooling.

f. Temperature History: The System shall have the capability to store the temperature, valve, and fan states for each room for at least three months, with all changes being reported.

g. Energy Conservation:

1) The System shall provide optimized energy conservation measures with minimum inconvenience to the guest. At least four setback strategies shall be employed: two when a room is un-rented (either occupied by staff or unoccupied), and two more when a room is rented (either occupied or unoccupied).
2) The System shall obtain rented status automatically from the Property Management System (PMS). No manual data entry shall be required by the hotel to update the room rented status.
3) The System shall determine room occupancy automatically. The System shall keep the room status as occupied even while the guest is asleep.
4) Setback values and related parameters shall be independently adjustable for rented and un-rented modes. For example, a room may be declared unoccupied 15 minutes after door closure if rented and no motion was detected, but it may take only two minutes to return the room to the unoccupied mode if the room is un-rented.
5) Reduced on/off switching during the night or “night setback” shall be available for implementation by choice of the property as a means to further reduce energy consumption while the guest is asleep.

6) The System will also implement setback strategies or cycle off HVAC equipment when exterior doors or windows are opened and the space is trying to maintain a target temperature. Switches will be applied to all active exterior windows and doors. They can be either wired or wireless.
7) The System shall also offer occupancy based lighting control which can be also coupled with a Master Light Switch installed by the entry door.
7) The System can include peak demand controls that will interface with the Building Management System (BMS) or use an integrated peak demand limiting module. Load shedding strategies will be initiated in the following hierarchy: Un-rented rooms will be set back first; then rented, unoccupied rooms; and finally rented, occupied rooms. Demand parameters and load shedding sequences shall be adjustable to allow for minimal guest discomfort while optimizing energy conservation efforts.

h. Digital Thermostat: (Model E528) the unit shall be modular in construction so that each of the modules can be added at a later time if not installed initially.

1) The System shall include a wall-mounted, illuminated digital thermostat. The thermostat will be able to display current room temperature, target temperature, and outside temperature in degrees F and degrees C, as well as the humidity level.
2) The thermostat shall be easy to operate, and shall allow changing the target temperature in steps of 1 degree F or 0.5 degree C. Clear indication shall be provided when the HVAC has been turned off.
3) The thermostat shall have the capacity to work with a built-in Passive Infrared (PIR) motion sensor
4) The thermostat shall be capable of directly controlling HVAC units operating on voltages ranging from 12VDC to 277VAC without the requirement of secondary control relays for the higher voltage applications. The thermostat shall also be available in a battery operated version to facilitate installation where the provision of power may not be practical.
5) The thermostat shall also be provided with an IR transceiver that will allow remote control of lamps that are equipped with IR receiving modules, an IR capable Entry Light Switch, and the Electronic Door Lock (EDL).
6) The thermostat shall be connectable to the System via a 2-conductor, low-voltage cable. The thermostat shall also have the capability of connecting to the HVAC equipment wirelessly via Infra Red or RF signals.
7) The thermostat shall be capable of controlling HVAC units wirelessly using IR technology that is immune to fluorescent light interference or RF (Zigbee) technology. Direct line-of-sight communication shall not be a requirement for proper IR functionality.
8) The thermostat shall be capable of having the ecoMODE® green button added as an option that the guest can use to opt-in to the property's sustainability practices.

3. Occupancy Detection: The System shall combine inputs from the EDL or door-position switch and from a PIR motion detector to determine whether the room is occupied at any time. Activation of any switch on the digital thermostat or any light switch that is controlled by the System while the entry door is closed shall place the room in the occupied mode. The current occupancy state of the room shall be available to the room controller that controls the room HVAC system, as well as to the outside door panel and to a server and its workstations.

B. Access Control: The System shall seamlessly integrate with select third party (Saflok, TimeLox, Vingcard or equal) Electronic Door Locks (EDL's) to create a centrally controlled access control system. The integrated access system shall meet the following requirements:

1. Wireless Link: The EDL shall communicate with the System via an IR wireless wall-mounted entry light, a wireless ceiling-mounted IR transceiver, or a wireless wall-mounted IR transceiver.

    a. Wireless Wall-Mounted Entry Light: A wireless wall-mounted entry light (S217 or S217D) switch will be installed in the guestroom and a wireless transceiver installed in the guestroom side of the lock. (The transceiver will be installed by Saflok, TimeLox, Vingcard or equal EDL manufacturer and provided by INNCOM.) The link shall be immune to interference from TV remote controls, fluorescent lights in close proximity to either the EDL or any System component, and radio signals generated by two-way communication devices in the property.

    b. Wireless Ceiling-Mounted IR Transceiver: A wireless ceiling-mounted IR transceiver (K592C) will be installed in the guestroom and a wireless transceiver installed in the guestroom side of the lock. (The transceiver will be installed by Saflok, TimeLox, Vingcard or equal EDL manufacturer and provided by INNCOM.) The link shall be immune to interference from TV remote controls, fluorescent lights in close proximity to either the EDL or any System component, and radio signals generated by two-way communication devices in the property.

    c. Wireless Wall-Mounted IR Transceiver: A wireless wall-mounted IR transceiver (K592W, Eye5) will be installed in the guestroom and a wireless transceiver installed in the guestroom side of the lock. (The transceiver will be installed by Saflok, TimeLox, Vingcard or equal EDL manufacturer and provided by INNCOM.) The link shall be immune to interference from TV remote controls, fluorescent lights in close proximity to either the EDL or any System component, and radio signals generated by two-way communication devices in the property.

2. Fast Response: The link between the System and the EDL shall provide a 0.5-second response time to meet the functional requirements defined herein.

3. EDL Battery Life: The addition of the required circuitry in the EDL to facilitate wireless communication with the System shall not materially reduce the service life of the batteries that power the EDL. Under no condition shall the service life be less than 18 months. A low battery warning shall be provided as a system alarm.

4. Door Status: The linked EDL shall report to the System any change in the status of the door opening. Such information shall be used by the System in its Occupancy logic, as defined herein. Note that said link shall alleviate the need for the installation of a separate door contact.

5. Staff Access Restriction: In addition to the normal staff access rights as controlled by the door locks, the EDL shall deny access to low-level staff cardkeys when a guest occupies the room.

6. Staff Access Cancellation: The System shall allow instantaneous cancellation of any staff card, without affecting the access rights of other staff cards. The cancellation shall take effect in specific rooms, a group of rooms, or the entire property within three seconds. The System shall automatically update the cancellation list in replaced locks to prevent access by unexpired, cancelled staff cards.

7. Guest Card Cancellation: The guest card shall be denied access to a room immediately upon the guest checkout, even if the card's date of expiration has not yet been exceeded.

8. VIP Guest Cards: The System shall accept pre-issued VIP cards for access to the guestroom. Authorization for the use of VIP cards shall be passed to the System from the PMS. The System shall transmit this authorization to the appropriate EDL.

9. Alarms and Reports: The System shall report the following exception conditions:

    a. Low EDL Battery: The System shall generate a report of all EDL that have a low battery condition. Replacing the battery in the EDL will automatically clear the alarm condition in the central computer.

    b. Door Open Too Long: The System shall generate an alarm if the guestroom door has been left open for a period exceeding a preset time period.

    c. Door Ajar: The System shall generate an immediate alarm if the guestroom door is partially closed, but not latched.

    d. Access History: Every access or attempted access from any guestroom door shall be reported and stored within 15 seconds at the server level. This data shall be available for retrieval by date, room number, or card number. Staff card access information shall also be accessible for retrieval by staff member name.

10. Remote Door Control: The System shall allow authorized staff to unlock EDLs remotely.

11. Fault Tolerance: The System shall allow authorized access to the guestroom by both staff and guest, even in the event of power failure to any component of the System.

12. In-Room Diagnostics: The System shall provide a simple method of allowing the staff to determine if an access problem is caused by the EDL or by a System component.

13. Central Diagnostics: The System shall allow direct diagnostic and programming of parameters in the EDL, if authorized by the EDL manufacturer. Such diagnostics shall be similar to the functions available at the EDL using a hand-held diagnostic tool provided by the EDL manufacturer.

C. Central Interface (CI) Server Application:

1. Each guestroom system or sub-system will communicate in real time with a central server running INN*control*-II application software. The software shall provide a comprehensive list of room status information and alarms, and shall also interface among the rooms and other systems in the hotel.

    a. PMS Interface: The software shall interface with the PMS computer through a serial link or TCP/IP. The PMS will provide the INN*control*-II software with current sale status of the guestrooms (rented/un-rented and check-in/checkout). This information shall be transferred from the INN*control*-II software to the room within five seconds, and will be used to determine the operation of the HVAC, lights, and other loads in the room. The INN*control*-II server shall also be linked and interfaced with the EDL server.

    b. Management Display: The INN*control*-II application, or terminals connected to the INN*control*-II server, shall provide access to management to view and control such parameters as room temperature, room target temperature, HVAC operation, light control, and other conditions and statuses. In general, the INN*control*-II application shall provide access to any function of the room control system that is available to the guest in the room. The System shall be capable of interfacing with the Hotel Ethernet System via an RS 485 or TCP/IP interface.

    c. Remote Access/Diagnostics: The application shall provide full support of a remote terminal connected via modem or TCP/IP, or via a serial link to the server. The server software architecture shall be of a client/server structure. The remote terminals shall be PCs operating under MS Windows 2000 or later. The application shall be capable of running complete diagnostics of the System from a remote service center via dial-up phone lines or TCP/IP.

d. Alarm Outputs: The application software shall be programmable to route alarm conditions to a printer, paging system, file, hard disk, third-party interface, or the PMS.

e. The user shall have the option of *not* logging on, which will allow View (read-only) use of the software, or logging on, which will allow Control functions based on the logon identification.

f. The software shall open to a pre-determined default language. It shall also be possible to choose another language available from the list.

g. In the software, the first screen that appears when INN*control*-II is opened is the 'Quick View' screen. Each guestroom selected for Quick View display shall be represented by a block on the screen. The block shall be numbered to correspond to the actual room number. By right-clicking on a room block, the user shall be able to access the menus and sub-menus that will display selected information for that room. The resulting menu shall allow the display of butler calls, MUR calls, valet requests, pick up tray requests, DND indications, SOS indications, and possibly one or two other requests if desired by the property – for example, cab request.

h. All service requests shall be displayed at once on the Quick View screen. The color coding shall allow easy recognition of each type of call.

i. The software shall display Housekeeping Calls to show a list of rooms requesting the indicated service. Other types of information shall also be optionally shown in the communication area, including clean/dirty room status, notifications, and issues to be handled by the front desk.

j. The software shall allow for the display of guest preferences including ADA/hearing impaired rooms, kosher/Sabbath rooms or eco-Mode rooms.

   1) ADA/hearing impaired rooms shall be set up such that the entry light flashes 10 times when the doorbell outside the room is pressed. An INNCOM P564 doorbell kit and S217 entry light switch are required for this function.
   2) Kosher/Sabbath rooms are set up such that all automatic functions that would be triggered by guests are suspended and the HVAC does not respond to occupancy information.
   3) eco-Mode rooms are activated when the guest presses the Green Button on the thermostat or eco-Mode programmed switches, thus enrolling in the property's environmental sustainability programs.

k. The software shall offer a Dynamic Suite Linking option and it shall display rooms that are linked as suites. The linked rooms shall be color-coded, and the type of link (common door or connecting door) shall be shown displayed in the room blocks.

l. The software shall be able to display as a minimum the following room conditions:

   1) Rented – Shows which rooms are currently rented.
   2) Occupancy – Shows which rooms are currently occupied, either by guests or staff.
   3) Rented + Occupancy – Shows which rooms are rented *and* occupied.
   4) Clean Status – Shows which rooms have been cleaned and which need cleaning. This option also shows "supervisor required" and "out-of-order."
   5) Dirty Rooms – Shows which rooms need cleaning. The color coding will indicate the rented and occupancy status for these rooms.
   6) Supervisor Visit Requested – Shows which rooms have been cleaned and are ready for review by a supervisor.
   7) Out of Order – Shows which rooms are out of order for any reason (such as equipment needing repair).
   8) Telephone Usage – Shows which rooms have telephones currently in use.
   9) Safe and Orphaned Valuables – Shows which rooms have a locked safe and which rooms have "orphaned" (left behind) valuables in the safe.

10) Minibar Used – Shows which rooms need replenishment for the minibar.
11) Measured Room Temperature – Shows the temperature of each room on the block grid.
12) Target Room Temperature – Shows the desired room temperature for each room on the block grid.
13) AC Mode – Shows the operational status of the air conditioning system for all rooms on the block grid.
14) Measured, Target and AC Mode – Shows all the above on the block grid.
15) Measured Humidity – Shows the humidity for each room on the block grid.
16) HVAC Equipment Operation – Shows heating, cooling, and fan operation for each room on the block grid.
17) Second Stage Operation – Shows forced, ready, active, and normal status for each room on the block grid.
18) Peak Demand/Load Shedding/Fire – Shows high, medium, low, and normal for peak demand/load shedding, and shows HVAC response to fire.
19) Open Doors or Windows – Shows which rooms have open doors or windows.
20) ETM – Shows rooms that have no energy management devices currently operating.
21) VIP/Reduced Energy Management – Indicates room thermostat is not being controlled by the system.
22) De-Humidification – Shows all rooms on the block grid that are being dehumidified.
23) De-Icing – Shows all rooms on the block grid that are being de-iced.
24) HVAC Trouble – Shows all rooms on the block grid with active HVAC alarms.
25) Equipment Type – Shows the HVAC equipment type for all rooms on the block grid.

m. The software shall display diagnostic information for guestroom devices.

n. The software shall have Navigation Tree Displays. The rows of icons allow the user to display property views in the navigation area below the icon bars by clicking on the icon. A room can be selected from the Navigation Tree for display of its statuses. In the Floor View and Network View displays, a plus (+) or minus (-) sign will appear before each room. A plus sign indicates that more information can be displayed by clicking on the plus sign.

o. The default icon in the navigation area shall be the Floor View, which shall display a list of hotel floors. Double clicking on a floor shall display a list of rooms on the floor.

p. The software shall have a Network View icon to display the guestrooms organized according to their network connectivity status.

q. The software shall be able to display a graph of the HVAC trend for each room. The display shall show the room's temperature band as a yellow block. The HVAC trend line shall be color-keyed: black (the HVAC is not currently heating or cooling), red (the HVAC is heating), or blue (the HVAC is cooling).

r. The software shall be able to generate reports that show outstanding guest requests at the time of report generation. The report shall be able to be generated in a printable notepad format with the time of day of the report generation shown at the top of the report. The report can be saved and/or printed, making it convenient for staff to carry as a reminder of outstanding requests.

s. The software shall be able to receive and set guest requests from INN*control*-II or from other INNCOM systems in the property. Whatever the source of the setting, a guest request shall be displayed on every INN*control*-II screen that has the particular room selected for view. For example, a guest may press a switch in the guestroom to request MUR service. The request will appear on INN*control*-II.

t. The software shall allow staff to "take ownership" of guest requests. By taking ownership, the staff member commits to performing the request or ensuring that it is

performed. Once ownership is taken, the room shall be re-listed along with the name of the person who has taken ownership. This allows anyone on a terminal anywhere in the property to see who has taken responsibility for a guest request.

u. The software shall allow Hotel staff to designate a room needing cleaning or as being out of order. Once the room has been cleaned, staff can report that it has been cleaned and request review by a supervisor. The software indicates that a hotel maid has seen that the room needs to be cleaned.

D. Room Communications, Monitoring and Control:

1. Throughput: The INN*control*-II application server and the network that links it to the rooms shall be able to handle a minimum of five transactions per second per 500 rooms. A transaction is defined as the sending of a command or data to a room from the INN*control*-II server and the receipt of acknowledgment of the proper execution of such command back at the INN*control*-II server. The System and its network shall guarantee a response within five seconds when accessing any room component remotely. Such response shall not be conditional on any other activities that take place at that time anywhere else in the System.

2. Network Integrity: The communication in the System shall comply with ISO/OSI standards. The network shall be secure from insertion of commands from external stations. Errors in communications shall be detected and corrected automatically. The addition and removal of stations shall be captured and reported as an alarm by the INN*control*-II server.

a. Networking Capabilities: The System shall be capable of communicating from the INN*control*-II server to the guestroom devices using a single shielded or unshielded twisted pair of wires, Cat3 or better.

b. Networking Capabilities: The System shall be capable of communicating from the INN*control*-II server to the guestroom devices using a dedicated or shared Ethernet network, running on Cat 6 or fiber.

E. Field Programmability:

1. Parameter Changes: All room-related parameters, such as target temperature upon check-in, setback temperatures, and the like, shall reside in non-volatile memory in each room and shall be available for programming from the INN*control*-II server as well as the in-room thermostat. The server shall be able to access rooms on an individual basis, in groups, or in total (i.e., the entire property at one time).
2. Program Changes: The application program residing in the room controller shall be modifiable through the INN*control*-II server computer without the need to visit the room. The program stored in each room shall not be affected by the temporary loss of power, regardless of the duration of the power outage.
3. Power Fail Recovery: After a power outage, the System throughout the hotel shall start up automatically and will be fully operational within five minutes after restoration of power. In the rooms, all loads controlled by the System will be returned to their previous states, including target temperature, selected fan speed operation, and lights, regardless of the duration of the power outage.
4. Noise Restriction: All system components shall be installed in such a manner as to eliminate audible noise to the guest when the System operates while the guest is asleep.
5. Code Compliance: Components installed by the Vendor and wiring/installation performed by the Vendor shall comply with the applicable standards and electrical codes.

PART 3 – EXECUTION

3.1 INSTALLATION

A. There shall be strict compliance with the Manufacturer's instructions and recommendations. The onset of work shall indicate that the Installer accepts the existing substrates and conditions. System installation shall be coordinated with related and adjacent work.

B. The system shall be tested for proper operation in accordance with the Manufacturer's commissioning guide. Damaged components shall be repaired or replaced until the proper operation is achieved.

C. The Installer shall instruct the Owner's personnel in proper operation and maintenance of the system.

END OF SECTION

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END OF ELECTRICAL INDEX

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Supporting Devices For Electrical Components.
2. Electricity-Metering Components.
3. Concrete Equipment Bases.
4. Electrical Demolition.
5. Cutting And Patching For Electrical Construction.
6. Touchup Painting.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete.
2. Section 07 84 00 - Firestopping.
3. Section 09 90 00 - Painting.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For electricity-metering equipment.
2. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.
3. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. All work to be in accordance with latest requirements of the N.E.C. and all other applicable codes and regulations of authorities having jurisdiction over the work.

1.04 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.

2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 08 Section 08 31 00 - "Access Doors."

E. Coordinate all work with Division 15. Electrical Contractor shall provide all wiring and final connection to all line voltage thermostats. Thermostat provided and installed by Division 15.

F. All electrical drawings are to be read in conjunction with the project specifications and all other related contract drawings.

G. The contractor shall examine the site and observe the conditions under which the work will be done or other circumstances which will affect the contemplated work. No allowance will be made subsequently in the connection for any error or negligence on the contractor's part.

H. The contractor shall verify exact location, size and extent of all existing utilities, obstructions and/or other conditions which may affect the proposed work under the project. The contractor shall take every precaution to prevent damage to existing work and shall repair any damage as a result of this work.

I. The contractor shall verify all door swings in the field and mount switches on knob side of doors or as approved by the engineer.

J. The contractor shall carefully examine all contract drawings/specifications and be responsible for the proper fittings of materials and equipment at each location as indicated without substantial alteration. The drawings are generally diagrammatic and because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Furnishing such fittings that are required to meet such conditions shall be furnished and installed at no cost.

PART 2 PRODUCTS

2.01 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch diameter slotted holes at a maximum of 2 inches o.c., in webs.

1. Channel Thickness: Selected to suit structural loading.

2. Fittings and Accessories: Products of the same manufacturer as channel supports.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

E. Pipe Sleeves: ASTM A53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

G. Expansion Anchors: Carbon-steel wedge or sleeve type.

H. Toggle Bolts: All-steel springhead type.

2.02 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

A. Current-Transformer Cabinets: Comply with requirements of electrical power utility company.

B. Meter Sockets: Comply with requirements of electrical power utility company.

2.03 CONCRETE BASES

A. Concrete Forms and Reinforcement Materials: As specified in Section 03 30 00 (03300) - "Cast-in-Place Concrete."

2.04 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 EXECUTION

3.01 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

E. Coordinate work with other trades and install conduit and boxes to clear embedded ducts, openings, etc. and all structural features.

F. Unless otherwise noted, mounting heights, as shown, are from finished floor to top of panelboard and to centerline of other equipment. Coordinate all mounting heights with contract drawings, local code requirements, and all A.D.A. requirements.

1. Toggle (snap) switch: 4’-0”.
2. Enclosed circuit breaker: 5’-0”
3. Disconnect (safety) switch: 5’-0”.
4. Motor starter: 5’-0”.
5. Panelboard: 6’-6”.

3.02 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations, Storage Rooms and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.03 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.

K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. New Concrete: Concrete inserts with machine screws and bolts.
4. Existing Concrete: Expansion bolts.
5. Steel: Welded threaded studs or spring-tension clamps on steel.
    a. Field Welding: Comply with AWS D1.1.
6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
7. Light Steel: Sheet-metal screws.
8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.04 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT

A. Install equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

3.05 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Section 07 84 00 “Firestopping."

3.06 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 "Cast-in-Place Concrete."

3.07 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.08 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Supporting devices for electrical components.
2. Electricity-metering components.
3. Concrete bases.
4. Electrical demolition.
5. Cutting and patching for electrical construction.
6. Touchup painting.

3.09 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Section 09 90 00 - "Painting."

3.10 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

B. Related Documents:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections:

1. Section 07 84 00 - Firestopping
2. Section 26 05 00 – Common Work Results for Electrical
3. Section 26 05 53– Identification for the Electrical Systems

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.03 QUALITY ASSURANCE

A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

B. Comply with NFPA 70.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver wires and cables according to NEMA WC 26.

1.05 COORDINATION

A. Coordinate layout and installation of cables with other installations.

B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Owner representative.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Wires and Cables:
   a. None.
2. Connectors for Wires and Cables:
   a. None.

B. Approved Manufacturers:

1. Wires and Cables:
   a. American Insulated wire Corp.: Leviton Manufacturing Co. (800-366-2492)
   b. Carol Cable Co., Inc. (401-728-7000)
   c. Southwire Company 800-444-1700
   d. Alcan Cable Division of Alcan Aluminum Corporation 77-392-2368
2. Connectors for Wires and Cables:
   a. AMP Incorporated 800-522-6752
   b. General Signal; O-Z/Gedney Unit (203-584-0571)
   c. Square D CO. a Division of Groupe Schneider 888-778-2733
   d. Alcan Cable Division of Alcan Aluminum Corporation 770-392-2368

2.02 BUILDING WIRES AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.

B. Rubber Insulation Material: Comply with NEMA WC 70.

C. Thermoplastic Insulation Material: Comply with NEMA WC 70.

D. Cross-Linked Polyethylene Insulation Material: Comply with NEMA WC 70.

E. Ethylene Propylene Rubber Insulation Material: Comply with NEMA WC 70.

F. Conductor Material: Copper

1. Feeders 100 ampere or greater may be aluminum "Alcan Stabiloy #8000", or approved substitution by listed manufacturers.

G. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

H. Multiconductor Cable: Metal-clad cable, Type MCI.

I. ROMEX: Solid conductor for No. 10 AWG and smaller.

2.03 CONNECTORS AND SPLICES

A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 WIRE AND INSULATION APPLICATIONS

A. Service Entrance: Type RHW or THWN, in raceway.

B. Horizontal Feeders: Type THHN/THWN, in raceway.

C. Vertical Feeders: Type THHN/THWW in raceway or type MC cable.

D. Horizontal Branch Circuits: Type THHN/THWN, in raceway.

E. Vertical Branch Circuits: Type THNN/THWW in raceway or Type MC Cable

F. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

3.03 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."

B. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables, parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Section 26 05 00 - "Common Work Results for Electrical."

F. Seal around cables penetrating fire-rated elements according to Section 07 84 00 "Firestopping."

G. Identify wires and cables according to Section 26 05 53 "Identification for Electrical Systems."

H. All guest room telephone, data and TV Cabling shall be routed through “ENT SMURF FLEX” from device junction box to above accessible corridor ceiling.

I. **All Romex cable must be concealed in walls or above ceiling and maintain a 15 minute fire barrier. There shall be NO exposed Romex cabling anywhere in the building.**

3.04 CONNECTIONS

A. Conductor Splices: Keep to minimum.

B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

C. Use splice and tap connectors compatible with conductor material.

D. Use oxide inhibitor in each splice and tap connector for aluminum conductors.

E. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

F. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.

G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.05 FIELD QUALITY CONTROL

A. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Grounding of Electrical Systems and Equipment.

a. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

B. Related Sections:

1. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables.

2. Section 26 41 13 - Lightning Protection for Structures: For additional grounding and bonding materials.

3. Section 32 90 00 - Planting.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For the following:

a. Ground rods.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Comply with UL 467.

B. Comply with NFPA 70; for overhead-line construction and medium-voltage underground construction, comply with IEEE C2.

C. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

1. Grounding Conductors, Cables, Connectors, and Rods:

a. Chance/Hubbell 573-682-5521

b. Copperweld Corp. 931-433-7177

c. Thomas & Betts, electrical 800-816-7809

2.02 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Section 26 05 19 - "Low-Voltage Electrical Power Conductors and Cables."

B. Material: Aluminum, copper-clad aluminum, and copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

E. Grounding Electrode Conductors: Stranded cable.

F. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

G. Bare Copper Conductors: Comply with the following:

1. Solid Conductors: ASTM B3.

2. Assembly of Stranded Conductors: ASTM B8.

3. Tinned Conductors: ASTM B33.

H. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.

2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

I. Ground Conductor and Conductor Protector for Wood Poles: As follows:

1. No. 4 AWG minimum, soft-drawn copper conductor.

2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir, or cypress or cedar.

J. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

K. Equipment Ground Conductor (Green) shall be included with all circuit conductors. In addition, provide a neutral conductor where applicable.

2.03 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.04 GROUNDING ELECTRODES

A. Ground Rods: copper-clad steel.

1. Size: 120” long by 3/4” in diameter.

PART 3 EXECUTION

3.01 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

F. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.

2. At doors, route the bus up to the top of the door frame, across the top of the doorway, and down to the specified height above the floor.

3.02 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.

D. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate equipment grounding conductor. Isolate equipment grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

F. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

G. Air-Duct Equipment Circuits: Install an equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners and heaters. Bond conductor to each unit and to air duct.

H. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus.

2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

I. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing a separate equipment grounding conductor with supply branch-circuit conductors.

J. Common Ground Bonding with Lightning Protection System: Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

3.03 COUNTERPOISE

A. Ground the steel framework of the building with a driven ground rod at the base of every corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart. Provide a grounding conductor (counterpoise), electrically connected to each ground rod and to each steel column, extending around the perimeter of the building. Use tinned-copper conductor not less than No. 2/0 AWG for counterpoise and for tap to building steel. Bury counterpoise not less than 18 inches below grade and 24 inches from building foundation.

3.04 INSTALLATION

A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.

2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

F. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.

G. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.

3.05 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Non-contact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A .

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.06 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING

A. Manholes and Handholes: Install a driven ground rod close to wall and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide a No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.

B. Connections to Manhole Components: Connect exposed-metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

C. Pad-Mounted Transformers and Switches: Install two ground rods and counterpoise circling pad. Ground pad-mounted equipment and non-current-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Use tinned-copper conductor not less than No. 2 AWG for counterpoise and for taps to equipment ground pad. Bury counterpoise not less than 18 inches below grade and 6 inches from the foundation.

3.07 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing

natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.

3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

   a. Equipment Rated 500 kVA and Less: 10 ohms.

   b. Equipment Rated 500 to 1000 kVA: 5 ohms.

   c. Equipment Rated More Than 1000 kVA: 3 ohms.

   d. Substations and Pad-Mounted Switching Equipment: 5 ohms.

   e. Manhole Grounds: 10 ohms.

4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Owner representative promptly and include recommendations to reduce ground resistance.

3.08 GRADING AND PLANTING

A. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Section 32 90 00 - "Planting." Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Raceways include the following:

a. RMC.

b. PVC, Schedule 40 or 80.

c. EMT.

d. FMC.

e. LFMC.

f. LFNC.

g. RNC.

h. Wireways.

i. ENT

2. Boxes, enclosures, and cabinets include the following:

a. Device boxes.

b. Floor boxes.

c. Outlet boxes.

d. Pull and junction boxes.

e. Cabinets and hinged-cover enclosures.

B. Related Sections:

1. Section 07 84 00 - Firestopping.

2. Section 26 05 00 – Common Work Results for Electrical: For raceways and box supports.

3. Section 26 27 26 - Wiring Devices: For devices installed in boxes and for floor-box service fittings.

1.02 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. LFNC: Liquidtight flexible nonmetallic conduit.

F. RMC: Rigid metal conduit.

G. RNC: Rigid nonmetallic conduit.

H. ENT Electrical non-metallic tubing.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.04 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electric Code".

B. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, "National Electric Code" Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

3. Comply with NECA 111 “Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) (ANSI)”

1.05 COORDINATION

A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Metal Conduit and Tubing:

a. None.

2. Flexible Conduit:

a. None.

3. Nonmetallic Conduit and Tubing:

a. None.

4. Conduit Bodies and Fittings:

a. None.

5. Metal Wireways:

a. None.

6. Nonmetallic Wireways:

a. None.

7. Surface Metal Raceways:

a. None.

8. Surface Nonmetallic Raceways:

a. None.

9. Boxes, Enclosures, and Cabinets:
    a. None.

B. Approved Manufacturers:
1. Metal Conduit and Tubing:
    a. Anixter Brothers, Inc. (800-323-8166)
    b. Carol Cable Co., Inc. (401-728-7000)
    c. Wheatland tube co. (800-257-8128)
2. Flexible Conduit:
    a. Carol Cable Co., Inc. (401-728-7000)
    b. Electri-Flex Co. (800-323-6174)
3. Nonmetallic Conduit and Tubing:
    a. Hubbell, Inc. (800-722-6437)
    b. Lamson & Sessions; Carlon Electrical Products. (800-322-7566)
    c. Thomas & Betts Corp. (800-816-7809)
4. Conduit Bodies and Fittings:
    a. Anixter Brothers, Inc. (800-323-8166)
    b. Carol Cable Co., Inc. (401-728-7000)
    c. Wheatland tube co. (800-257-8128)
5. Metal Wireways:
    a. Hoffman Engineering Co. (203-425-8900)
    b. Keystone/Rees, Inc. (219-495-9811)
    Square D Co. Division of Groupe Schneider (888-778-2733)
6. Nonmetallic Wireways:
    a. Hoffman Engineering Co. (203-425-8900)
    b. Lamson & Sessions; Carlon Electrical Products (800-322-7566)
7. Boxes, Enclosures, and Cabinets:
    a. Hoffman Engineering Co. (203-425-8900)
    b. Hubbell, Inc. (800-722-6437)
    c. Thomas & Betts Corp. (800-816-7809)

2.02 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.
B. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.
C. EMT and Fittings: ANSI C80.3.
    1. Fittings: Set-screw or compression type.
D. FMC: Zinc-coated steel.
E. LFMC: Flexible steel conduit with PVC jacket.

F. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.03 NONMETALLIC CONDUIT AND TUBING

A. RNC: NEMA TC 2, Schedule 40 or 80 PVC.

B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

C. LFNC: UL 1660.

2.04 METAL WIREWAYS

A. Material: Sheet metal sized and shaped as indicated.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

D. Wireway Covers: As indicated

E. Finish: Manufacturer's standard enamel finish.

2.05 NONMETALLIC WIREWAYS

A. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections using plastic fasteners.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Select features, unless otherwise indicated, as required to complete wiring system and to

2.06 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1.

2.07 FLOOR BOXES

A. Floor Boxes: Cast metal, fully adjustable, rectangular.

2.08 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.09 ENCLOSURES AND CABINETS

A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid steel.
2. Concealed: Rigid steel.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.

B. Indoors: Use the following wiring methods:

1. Exposed on ceilings and wall in Mechanical Equipment Rooms galvanized rigid steel conduit.
2. Concealed in spaces above hung ceiling and wall: Electrical Metallic Tubing (EMT).
3. Connection to Vibrating Equipment (Including and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
    a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

C. Underground or concrete encased:

1. Schedule 40 PVC.

3.03 INSTALLATION - GENERAL

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Do not install aluminum conduits embedded in or in contact with concrete.

C. Set floor boxes level and adjust to finished floor surface.

D. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

E. Size all conduits supplying motors and associated control equipment to include equipment grounding conductor sized per NFPA 70 whether or not shown on the drawings or specified.

F. Unless otherwise noted, terminate all conduits stubbing up inside rooms or roof as follows:

1. Conduits for AC power: Stub up 6” above finished floor and provide concrete sill to protect stub-ups.
2. On PVC conduit for AC power and control cable, provide PVC to galvanized steel rigid conduit adaptor.
3. Plug or cap all conduits during construction or until permanent conductors are installed. Taped ends will not be allowed.

G. In exposed conduit runs longer than 300 feet, expansion fittings shall be installed. Where embedded conduit crosses a structural expansion joint, expansion and deflection fitting shall be installed.

H. Tighten set screws of threadless fittings with suitable tools.

I. Complete raceway installation before starting conductor installation.

3.04 INSTALLATION - RACEWAYS

A. Minimum Raceway Size: 3/4-inch trade size (DN21).

B. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.

C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

D. Install raceways level and square and at proper elevations. Provide adequate headroom.

E. Support raceways as specified in Section 26 05 00 - "Basic Electrical Materials and Methods."

F. Use temporary closures to prevent foreign matter from entering raceways.

G. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

H. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

I. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

J. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

K. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, and leave at least 1-inch concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.

2. Space raceways laterally to prevent voids in concrete.

3. Run conduit larger than 1-inch trade size (DN27) parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.

4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit or rigid steel conduit, before rising above floor.

L. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.

2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

M. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.

2. Use insulating bushings to protect conductors.

N. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.

O. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

P. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

Q. Telephone and Signal System Raceways, 2-Inch Trade Size (DN53) and Smaller: In addition to the above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

3.05 INSTALLATION - ACCESSORIES

A. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.

2. Where otherwise required by NFPA 70.

B. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.

C. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

D. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

3.06 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.07 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

3.08 ELECTRICAL NON-METALLIC TUBING

A. Guest suites: Install from telephone, data and TV junction box to above accessible corridor ceiling.

END OF SECTION

SECTION 26 05 36 - CABLE TRAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cable Trays And Accessories.

B. Related Sections:

1. Section 07 84 00 - Firestopping: For firestopping materials and installation requirements.
2. Section 26 05 00 – Common Work Results for Electrical
3. Section 26 05 53 – Identification for the Electrical Systems

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Shop Drawings: Detail fabrication and installation of cable tray, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings.
2. Design Calculations: Verify loading capacities for supports.
3. Coordination Drawings: Include floor plans and sections drawn to scale. Include scaled cable tray layout and relationships between components and adjacent structural and mechanical elements.
4. Factory-certified test reports of specified products, complying with NEMA VE 1.
5. Field Test Reports: Indicate and interpret test results for compliance with performance requirements specified in "Field Quality Control" Article.
6. Maintenance Data: For cable trays to include in the maintenance manuals specified in Section 01 78 23 **“**Operating and Maintenance Data.**”**

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain cable tray components through one source from a single manufacturer.

B. Listing and Labeling: Provide cable trays and accessories specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

C. Comply with NEMA VE 1, "Metal Cable Tray Systems," for materials, sizes, and configurations.

D. Comply with NFPA 70.

1.04 COORDINATION

A. Coordinate layout and installation of cable tray with other installations.

1. Revise locations and elevations from those indicated as required to suit field conditions and as approved by Owner representative.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

a. B-Line Systems, Inc. (800-851-7415)

b. Chalfant Cable Trays (330-273-3510)

c. Husky: MP Husky Corp. (864-234-4800)

2.02 MATERIALS AND FINISHES

A. Cable Trays, Fittings, and Accessories: Steel, hot-dip galvanized after fabrication, complying with ASTM A123, Class B2.

B. Cable Trays, Fittings, and Accessories: Aluminum, complying with Aluminum Association's alloy 6063-T6 for rails, rungs, and cable trays, and alloy 5052-H32 or 6061-T6 for fabricated parts.

C. Protect steel hardware against corrosion by galvanizing according to ASTM B633 or cadmium plating according to ASTM B766.

D. Fabricate cable tray products with rounded edges and smooth surfaces.

E. Sizes and Configurations: Refer to Cable Tray Schedule at the end of the Section for specific requirements for types, materials, sizes, and configurations.

2.03 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. Barrier Strips: Same materials and finishes as cable tray.

C. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.04 WARNING SIGNS

A. Lettering: 1-1/2-inch- high, black letters on yellow background with legend: "WARNING! NOT TO BE USED AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL."

B. Materials and fastening are specified in Section 26 05 53 - "Identification for the Electrical Systems."

2.05 SOURCE QUALITY CONTROL

A. Perform design and production tests according to NEMA VE 1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of cable trays. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Cable tray shall be installed in Phone Switch Room only.

B. Install cable tray level and plumb according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.

C. Remove burrs and sharp edges from cable trays.

D. Fasten cable tray supports securely to building structure as specified in Section 26 05 00 - "Common Work Results for Electrical" unless otherwise indicated.

1. Locate and install supports according to NEMA VE 1.

2. Design supports, including fastenings to the structure, to carry the greater of the calculated load multiplied by a safety factor of 4 or the calculated load plus 200 lb.

E. Install expansion connectors where cable tray crosses a building expansion joint and in cable tray runs that exceed 90 feet. Space connectors and set gaps according to NEMA VE 1.

F. Make changes in direction and elevation using standard fittings.

G. Make cable tray connections using standard fittings.

H. Locate cable tray above piping, unless accessibility to cable tray is required or unless otherwise indicated.

I. Seal penetrations through fire and smoke barriers according to Section 07 84 00 "Firestopping."

J. Sleeves for Future Cables: Install capped sleeves for future cables through firestopping-sealed cable tray penetrations of fire and smoke barriers.

K. Workspace: Install cable trays with sufficient space to permit access for installing cables.

L. Install barriers to separate cables of different systems, such as power, communications, and data processing; or of different insulation levels, such as 600, 5000, and 15,000 V.

3.03 CONNECTIONS

A. Ground cable trays according to manufacturer's instructions.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 WARNING SIGNS

A. After installation of cable trays is completed, install warning signs in visible locations on or near cable trays.

3.05 FIELD QUALITY CONTROL

A. Grounding: Test cable trays to ensure electrical continuity of bonding and grounding connections.

B. Replace malfunctioning units.

3.06 CLEANING

A. On completion of cable tray installation, including fittings, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes, including chips, scratches, and abrasions.

3.07 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure cable tray is without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by cable tray manufacturer.

3.08 CABLE TRAY SCHEDULE

A. Run Designation:

1. Type: Ladder
2. Material and Finish: Aluminum
3. Width: 18”
4. Cross-Rung Spacing: 6”
5. Minimum Fitting Radius: 12”
6. Inside Depth: 4”
7. NEMA Load/Span Class:

END OF SECTION

SECTION 26 05 48 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes seismic restraints and other earthquake-damage-reduction measures for electrical components. It complements optional seismic construction requirements in the various electrical component Sections.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 04 20 00 - Unit Masonry
3. Section 05 12 00 - Structural Steel
4. Section 06 10 00 - Rough Carpentry
5. Section 26 05 00 - Common Work Results for Electrical

1.02 DEFINITIONS

A. IBC: International Building Code

B. Seismic Restraint: A fixed device (a seismic brace, an anchor bolt or stud, or a fastening assembly) used to prevent vertical or horizontal movement, or both vertical and horizontal movement, of an electrical system component during an earthquake.

C. Mobile Structural Element: A part of the building structure such as a slab, floor structure, roof structure, or wall that may move independent of other mobile structural elements during an earthquake.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. Illustrate and indicate types, styles, materials, strength, fastening provisions, and finish for each type and size of seismic restraint component used.

b. Anchor Bolts and Studs: Tabulate types and sizes, complete with report numbers and rated strength in tension and shear as evaluated by an agency approved by authorities having jurisdiction.

2. Shop Drawings: For anchorage and bracing not defined by details and charts on Drawings. Indicate materials, and show designs and calculations signed and sealed by a professional engineer.

a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.

b. Details: Detail fabrication and arrangement. Detail attachment of restraints to both structural and restrained items. Show attachment locations, methods, and spacings, identifying components and listing their strengths. Indicate direction and value of forces transmitted to the structure during seismic events.

3. Preapproval and Evaluation Documentation: By showing maximum ratings of restraints and the basis for approval (tests or calculations).

4. Coordination Drawings: Plans and sections drawn to scale and coordinating seismic bracing for electrical components with other systems and equipment, including other seismic restraints, in the vicinity.
5. Product Certificates: Signed by manufacturers of seismic restraints certifying that products furnished comply with requirements.
6. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
7. Material Test Reports: From a qualified testing agency indicating and interpreting test results of seismic control devices for compliance with requirements indicated.

1.04 QUALITY ASSURANCE

A. Comply with seismic restraint requirements unless requirements in this Section are more stringent.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing seismic engineering services, including the design of seismic restraints, that are similar to those indicated for this Project.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated.

1.05 PROJECT CONDITIONS

A. Project Seismic Hazard Exposure Group as Defined in IBC:

B. Acceleration Factor:

1.06 COORDINATION

A. Coordinate layout and installation of seismic bracing with building structural system and architectural features, and with mechanical, fire-protection, electrical, and other building features in the vicinity.

B. Coordinate concrete bases with building structural system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

a. B-Line Systems, Inc. (800-851-7415)
b. Thomas & Betts Corp (800-816-7809)
c. Unistrut Corporation (800-521-7730)

2.02 MATERIALS

A. Use the following materials for restraints:

1. Indoor Dry Locations: Steel, zinc plated.
2. Outdoors and Damp Locations: Galvanized steel.

2.03 ANCHORAGE AND STRUCTURAL ATTACHMENT COMPONENTS

A. Strength: Defined in reports by ICBO Evaluation Service or another agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Strength in tension and shear of components used shall be at least two times the maximum seismic forces to which they will be subjected.

B. Concrete and Masonry Anchor Bolts and Studs: Steel-expansion wedge type.

C. Concrete Inserts: Steel-channel type.

D. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A325.

E. Welding Lugs: Comply with MSS SP-69, Type 57.

F. Beam Clamps for Steel Beams and Joists: Double sided. Single-sided type is not acceptable.

G. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to the type and size of anchor bolts and studs used.

H. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.

2.04 SEISMIC BRACING COMPONENTS

A. Slotted Steel Channel: 1-5/8-by-1-5/8-inch cross section, formed from 0.1046-inch thick steel, with 9/16-by-7/8-inch slots at a maximum of 2 inches o.c. in webs, and flange edges turned toward web.

1. Materials for Channel: ASTM A 570, GR 33.

2. Materials for Fittings and Accessories: ASTM A575, ASTM A576, or ASTM A36.

3. Fittings and Accessories: Products of the same manufacturer as channels and designed for use with that product.

4. Finish: Baked, rust-inhibiting, acrylic-enamel paint applied after cleaning and phosphate treatment, unless otherwise indicated.

B. Channel-Type Bracing Assemblies: Slotted steel channel, with adjustable hinged steel brackets and bolts.

C. Cable-Type Bracing Assemblies: Zinc-coated, high-strength steel wire rope cable attached to steel thimbles, brackets, and bolts designed for cable service.

1. Arrange units for attachment to the braced component at one end and to the structure at the other end.

2. Wire Rope Cable: Comply with ASTM 603. Use 49- or 133-strand cable with a minimum strength of 2 times the calculated maximum seismic force to be resisted.

D. Hanger Rod Stiffeners: Slotted steel channels with internally bolted connections to hanger rod.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install seismic restraints according to applicable codes and regulations and as approved by authorities having jurisdiction, unless more stringent requirements are indicated.

3.02 STRUCTURAL ATTACHMENTS

A. Use bolted connections with steel brackets, slotted channel, and slotted-channel fittings to spread structural loads and reduce stresses.

B. Attachments to New Concrete: Bolt to channel-type concrete inserts or use expansion anchors.

C. Attachments to Existing Concrete: Use expansion anchors.

D. Holes for Expansion Anchors in Concrete: Drill at locations and to depths that avoid reinforcing bars.

E. Attachments to Solid Concrete Masonry Unit Walls: Use expansion anchors.

F. Attachments to Hollow Walls: Bolt to slotted steel channels fastened to wall with expansion anchors.

G. Attachments to Wood Structural Members: Install bolts through members.

H. Attachments to Steel: Bolt to clamps on flanges of beams or on upper truss chords of bar joists.

3.03 ELECTRICAL EQUIPMENT ANCHORAGE

A. Anchor rigidly to a single mobile structural element or to a concrete base that is structurally tied to a single mobile structural element.

B. Anchor panelboards, motor-control centers, motor controls, switchboards, switchgear, transformers, unit substations, fused power-circuit devices, transfer switches, busways, battery racks, static uninterruptible power units, power conditioners, capacitor units, communication system components, and electronic signal processing, control, and distribution units as follows:

1. Size concrete bases so expansion anchors will be a minimum of 10 bolt diameters from the edge of the concrete base.

2. Concrete Bases for Floor-Mounted Equipment: Use female expansion anchors and install studs and nuts after equipment is positioned.

3. Bushings for Floor-Mounted Equipment Anchors: Install to allow for resilient media between anchor bolt or stud and mounting hole in concrete.

4. Anchor Bolt Bushing Assemblies for Wall-Mounted Equipment: Install to allow for resilient media where equipment or equipment-mounting channels are attached to wall.

5. Torque bolts and nuts on studs to values recommended by equipment manufacturer.

3.04 SEISMIC BRACING INSTALLATION

A. Install bracing according to spacings and strengths indicated by approved analysis.

B. Expansion and Contraction: Install to allow for thermal movement of braced components.

C. Cable Braces: Install with maximum cable slack recommended by manufacturer.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to the structure at flanges of beams, upper truss chords of bar joists, or at concrete members.

3.05 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Make flexible connections in raceways, cables, wireways, cable trays, and busways where they cross expansion and seismic control joints, where adjacent sections or branches are supported by different structural elements, and where they terminate at electrical equipment anchored to a different mobile structural element from the one supporting them.

3.06 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform the following field quality-control testing:

B. Testing Agency: Engage a qualified testing agency to perform the following field quality-control testing:

C. Testing: Test pull-out resistance of seismic anchorage devices.

1. Provide necessary test equipment required for reliable testing.

2. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.

3. Schedule test with Owner, through Owner representative, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least seven days' advance notice.
4. Obtain Owner's representative approval before transmitting test loads to the structure. Provide temporary load-spreading members.
5. Test at least four of each type and size of installed anchors and fasteners selected by Owner representative.
6. Test to 90 percent of rated proof load of device.
7. If a device fails the test, modify all installations of same type and retest until satisfactory results are achieved.
8. Record test results.

END OF SECTION

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

B. Related Sections:

1. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables
2. Section 26 05 33 - Raceways and Boxes for Electrical Systems
3. Section 26 24 00 – Switchboards and Panel Boards
4. Section 26 27 26 - Wiring Devices
5. Section 26 28 16 - Enclosed Switches and Circuit Breakers

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For each electrical identification product indicated.

1.03 QUALITY ASSURANCE

A. Comply with ANSI C2.

B. Comply with NFPA 70 "National Electric Code”

C. Comply with ANSI A13.1 and NFPA 70 for color-coding.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

a. Brady USA, Inc. (800-541-1686
b. Panduit corp. (800-777-3300)
c. Seton Identification Products (800-571-2596)

2.02 RACEWAY AND CABLE LABELS

A. Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

1. Color: Black letters on orange field.
2. Legend: Indicates voltage

B. Pre-tensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.

C. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

D. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape.

1. Not less than 6 inches wide by 4 mils thick.

2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend indicating type of underground line.

E. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

F. Aluminum, Wraparound Marker Bands: Bands cut from 0.014-inch thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.

G. Plasticized Card-Stock Tags: Vinyl cloth with preprinted and field-printed legends. Orange background, unless otherwise indicated, with eyelet for fastener.

H. Aluminum-Faced, Card-Stock Tags: Weather-resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch thick, laminated with moisture-resistant acrylic adhesive, punched for fasteners, and preprinted with legends to suit each application.

2.03 NAMEPLATES AND SIGNS

A. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.

B. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.

C. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for the application. 1/4-inch grommets in corners for mounting.

D. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for the application. 1/4-inch grommets in corners for mounting.

E. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

2.04 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch.
2. Tensile Strength: 50 lb minimum.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: According to color-coding.

PART 3 EXECUTION

3.01 INSTALLATION

A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before applying.

E. Color Banding Raceways and Exposed Cables: Band exposed and accessible raceways of the systems listed below:

1. Bands: Pre-tensioned, wraparound plastic sleeves; colored adhesive tape; or a combination of both. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.

2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

3. Apply the following colors to the systems listed below:

a. Fire Alarm System: Red.

b. Fire-Suppression Supervisory and Control System: Red and yellow.

c. Combined Fire Alarm and Security System: Red and blue.

d. Security System: Blue and yellow.

e. Mechanical and Electrical Supervisory System: Green and blue.

f. Telecommunication System: Green and yellow.

F. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover.

G. Circuit Identification Labels on Boxes: Install labels externally.

1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.

2. Concealed Boxes: Plasticized card-stock tags.

3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.

H. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches overall, use a single line marker. Install line marker for underground wiring, both direct-buried cables and cables in raceway.

I. Secondary Service, Feeder, and Branch-Circuit Conductors: Color-code throughout the secondary electrical system.

1. Color-code 208/120-V system as follows:

a. Phase A: Black.

b. Phase B: Red.

c. Phase C: Blue.

d. Neutral: White.

e. Ground: Green.

2. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:

a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1-inch wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.

b. Colored cable ties applied in groups of three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.

J. Power-Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.

1. Legend: 1/4-inch steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.

2. Tag Fasteners: Nylon cable ties.

3. Band Fasteners: Integral ears.

K. Apply identification to conductors as follows:

1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.

2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.

3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.

L. Apply warning, caution, and instruction signs as follows:

1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

2. Emergency Operation: Install engraved laminated signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

M. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch high lettering on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:

1. Panelboards, electrical cabinets, and enclosures.

2. Access doors and panels for concealed electrical items.

3. Electrical switchgear and switchboards.

4. Emergency system boxes and enclosures.

5. Disconnect switches.

6. Enclosed circuit breakers.

7. Motor starters.

8. Push-button stations.
9. Power transfer equipment.
10. Contactors.
11. Remote-controlled switches.
12. Dimmers.
13. Control devices.
14. Transformers.
15. Telephone switching equipment.
16. Fire alarm master station or control panel.
17. Security-monitoring master station or control panel.

END OF SECTION

SECTION 26 08 01 - COMMISSIONING OF ELECTRICAL

PART 1 – GENERAL

1.01 Description

A. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.

B. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the contract documents the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing Contractors/Sub-Contractors.

2. Verify and document proper performance of equipment and systems.

3. Verify that O&M documentation left on site is complete.

4. Verify that the Owner's operating personnel are trained.

C. The commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractors/Sub-Contractors to provide a finished and fully functioning product.

1.02 Related Work

A. Drawings and general requirements of the Contract, including General Conditions and Requirements, Supplementary Conditions, Revisions and other Specification sections, apply to work in this section.

B. Refer to Specification Sections 01 91 00, "Commissioning" and 01 91 03, "Commissioning Process" for information regarding:

1. Responibilities.

2. Commissioning Documentation.

3. Systems to be commissioned.

PART 2 - PRODUCTS

2.01 Test Equipment

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Contractors/Sub-Contractors for the equipment being tested.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, shall be included in the Contractors/Sub-Contractors bid price.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance. All equipment shall be calibrated within the last year, and according to the manufacturer's recommended intervals, and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 – EXECUTION

3.01 Meetings

A. Attend meetings as requied by Sections 01 91 00, "Commissioning" and 01 91 03, "Commissioning Process".

3.02 Reporting

A. Provide installation, start-up, testing, and training reports as required by Sections 01 91 00, "Commissioning" and 01 91 03, "Commissioning Process".

3.03 Documentation, Non-Conformance and Approval of Tests

A. Documentation. Provide all documentation required by Sections 01 91 00, "Commissioning" and 01 91 03, "Commissioning Process".

B. Contractor shall respond to all Non-Conformance reports.

C. Cost of Retesting: The cost for the Contractors/Sub-Contractors to retest a construction and startup or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the CM.

D. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the PM.

END OF SECTION 27 08 01

SECTION 26 09 33 - CENTRAL DIMMING CONTROLS Cooper iLumin System

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Central dimming control systems.

B. Related Sections:
1. Section [26 27 26 - Wiring Devices/Lighting Controls.]
2. Fluorescent lighting ballasts controlled by central dimming control system.

1.2 REFERENCES

A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)
1. C62.41-1991 – Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

B. ASTM International (ASTM)
1. D4674 -02a Standard Test Method for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Fluorescent Lighting and Window-Filtered Daylight.

C. Canadian Standards Association (CSA).
1. CSA C22.2 # 14 Industrial Control Equipment
2. CSA C22.2 # 184 Solid-State Lighting Controls
3. CSA C22.2 # 156 Solid-State Speed Controls

D. International Electrotechnical Commission.
1. (IEC) 801-2 Electrostatic Discharge Testing Standard.
2. IEC/EN 60669-2-1 Switches for household and similar fixed electrical installations - electronic switches.

E. International Organization for Standardization (ISO)
1. 9001:2000 – Quality Management Systems.

F. National Electrical Manufacturers Association (NEMA)
1. WD1 (R2005) - General Color Requirements for Wiring Devices.

G. Underwriters Laboratories, Inc. (UL):
1. 489 (2002) - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
2. 508 (1999) - Standard for Industrial Control Equipment.
3. 1472 (1996) - Solid-State Dimming Controls.
4. 924 (2003) - Emergency Lighting and Power Equipment.

1.3 SYSTEM DESCRIPTION

A. Centralized dimming control system
1. Factory assembled dimming and metering panels.
2. Low voltage wallstations, touchscreens, interfaces, and sensors.

1.4 SUBMITTALS

A. Submit under provisions of Section [01330.]

B. Specification Conformance Document: Indicate whether the submitted equipment:
1. Meets specification exactly as stated.
2. Meets specification via an alternate means and indicate the specific methodology used.

C. Shop Drawings; include:
1. Load schedule indicating actual connected load, load type, and voltage per circuit, circuits and their respective control zones, circuits that are on emergency, and capacity,

phase, and corresponding circuit numbers.

2. Schematic of system.

D. Product Data: Catalog cut sheets with performance specifications demonstrating compliance with specified requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer: Minimum [10] years experience in manufacture of architectural lighting controls.

B. Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standard, including in-house engineering for product design activities.

C. Central dimming control system:

1. Meets UL, cUL, and/or CSA Standards specifically for the required loads. Provide evidence of compliance upon request.

1.6 PROJECT CONDITIONS

A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:

1. Ambient temperature: 0° to 40° C (32° to 104° F).
2. Relative humidity: Maximum 90 percent, non-condensing.
3. Lighting control system must be protected from dust and sprays during installation.

1.7 WARRANTY

A. Provide manufacturer's warranty covering 5 year parts to repair and replace defective equipment.

B. Provide manufacturer's additional warranty options to customer where required.

1.8 COMMISSIONING

A. Provide factory-certified field service engineer to a site visit to ensure proper system installation and operation under following parameters:

1. Qualifications for factory-certified field service engineer:
   a. Certified by the equipment manufacturer on the system installed.
2. Make a visit upon completion of installation of central dimming control system:
   a. Verify connection of power feeds and load circuits.
   b. Verify connection Wallstation controls.
   c. Verify proper connection iCAN link.
   d. Download system panel data to dimming panels.
   e. Check dimming panel load types and currents and remove by-pass jumpers.
   f. Verify system operation control by control, circuit by circuit.
   g. Obtain sign-off on system functions.
   h. User to be trained on system operation.

1.9 MAINTENANCE

A. Make ordering spare parts available to end user.

B. Make new replacement parts available for minimum of ten years from date of manufacture.

C. Provide factory direct technical support hotline.

D. Provide on-site service support where required.

E. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits to customer if desired.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Cooper Controls, – System: iLumin Architectural Control System

B. Basis of design product: Cooper iLumin system or subject to compliance and prior approval with specified requirements of this section, one of the following:

1. Cooper Controls iLumin

C. Substitutions:
   1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be made available to all bidders.
   2. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.
   3. Any substitutions provided by the contractor shall be reviewed at the contractor's expense by the electrical engineer at a rate of $200.00 per hour.
   4. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring.
   5. Provide complete engineered shop drawings (including power wiring) with deviations for the original design highlighted in an alternate color to the engineer for review and approval prior to rough-in.

2.2 GENERAL

A. Provide system hardware that is designed, tested, manufactured, and warranted by a single manufacturer.

B. Architectural Lighting Controls: Ten-year operational life while operating continually at any temperature in an ambient temperature range of 0° C (32°F) to 40° C (104°F) and 90 percent non-condensing relative humidity.

C. Designed and tested to withstand electrostatic discharges up to 12,000 V without impairment per IEC 801-2.

2.3 DIMMING / RELAY PERFORMANCE REQUIREMENTS

A. Electrolytic capacitors to operate under the component manufacturer's maximum temperature rating when device is under fully-loaded conditions in 40° C (104° F) ambient temperature.

B. Design and test dimmers/relays to withstand line-side surges without impairment to performance.
   1. Panels: Withstand surges without impairment of performance when subjected to surges of 6,000 volts, 3,000 amps per ANSI/IEEE C62.41 and per IEC 61000-4-5 surge requirements.
   2. Other power handling devices: Withstand surges without impairment of performance when subjected to surges of 6,000 volts, 200 amps per ANSI/IEEE C62.41.

C. Utilize air gap off, activated when user selects "off" at any control to disconnect the load from line supply.

D. Power failure memory and dimmer/relay recovery:
   1. When power is interrupted and subsequently returned, lights will automatically return to same levels (dimmed setting, full on, or off) prior to power interruption.
   2. In 3 phase panels loss of power to any phase should not effect operation or control dimmers on any other phase.

E. Dimmers:
   1. Provide real-time cycle-by-cycle compensation for incoming line voltage variations including changes in RMS voltage, frequency shifts, dynamic harmonics, and line noise.
   2. Control all light sources in smooth and continuous manner. Dimmers with visible steps are not acceptable.
   3. Each dimmer to be configurable in the field to provide a proper dimming curve for the specific light source.
   4. Minimum and maximum light levels user adjustable on circuit-by-circuit basis.
   5. Each individual circuit must include the ability to control the following load types standard, without additional modules or equipment.
      a. Magnetic Low Voltage (MLV) transformer:
         1) Contain circuitry designed to control and provide a symmetrical AC waveform

to input of magnetic low voltage transformers per UL 1472, Section 5.11.

2) Dimmers using unipolar load current devices (such as FETs or SCRs) to include DC current protection in the event of a single device failure.

b. Electronic Low Voltage (ELV) transformer:

c. Dimmer to be approved for use on the specific ELV transformer being used, Dimming equipment manufacturer to offer free testing services to ensure compatibility. Neon and cold cathode transformers:

1) Magnetic transformers: UL listed for use with normal (low) power factor magnetic transformers.

d. Fluorescent electronic dimming ballast: Refer to Section 16580 for dimming ballast specifications and performance.

e. Low Voltage Dimming (0-10V); Meet following requirements:

1) Capable of controlling any 0-10V source.

2) 0-10V analog voltage signal.

a) Provide isolated 0-10V output signal conforming to IEC 60929.

b) Sink current via IEC 60929.

c) Source current.

F. Non-dim circuits to meet the following requirements:

1. Rated life of relay: Minimum 1,000,000 cycles.
2. Load switched in manner so that there is no arcing at mechanical contacts when power is applied to and removed from load circuits.
3. Fully rated output continuous duty for inductive, capacitive, and resistive loads.

2.4 POWER PANELS

A. Product: SC Series.

B. Mechanical:

1. Meets UL, cUL, and/or CSA Standards specifically for the required loads. Provide evidence of compliance upon request.
2. Delivered and installed as a factory assembled panel listed to UL508.
3. Field wiring accessible from front of panel without need to remove dimmer assemblies or other components.
4. Panels passively cooled via free-convection, unaided by fans or other means.
5. Ship panels with each dimmer in mechanical bypass position by means of jumper bar inserted between input and load terminals. Jumpers to carry full rated load current and be reusable at any time without requiring a tool to reinstall them. Mechanical bypass device to allow for switching operation of connected load with dimmer removed by means of circuit breaker.

C. Electrical:

1. Panels contain branch circuit protection for each input circuit unless the panel is a dedicated feed-through type panel or otherwise indicated on the drawings.
2. Branch circuit breakers; meet following performance requirements:

a. Listed to UL 489 as molded case circuit breaker for use on lighting circuits.

b. Contain visual trip indicator; rated at 10,000 AIC, 120 V Dimming and 14,000 AIC, 277 V Dimming.

c. Thermal-magnetic construction for overload, short-circuit, and over-temperature protection. Use of breakers without thermal protection requires dimmers/relays to have integral thermal protection to prevent failures when overloaded or ambient temperature is above rating of panel.

d. Replaceable without moving or replacing dimmer/relay assemblies or other components in panel. Breakers shall be designed for use in frequent switching applications (switching duty rated) so that loads can be switched on and off by breakers.

3. Panel to contain 4 line LCD display controller in each panel
    a. All set up and adjustments of the panel can be made from this device.
    b. USB, RS485, Ethernet, and DMX connections must be included.
    c. Include Timeclock standard with control of:
        1) Scene selections.
        2) Fade zone to a level.
4. Real Time Energy Meter per circuit
    a. Electrical device to measure voltage and current within each circuit.
    b. Metered data can be polled via public command string from on board Ethernet input.

D. SC-UN Series
1. Each individual circuit dimmers is designed and tested to specifically control incandescent/tungsten, magnetic low voltage, electronic low voltage, neon/cold cathode, fluorescent dimming ballasts, 0-10V low voltage loads, and non-dim loads without additional internal or external modules.
2. Utilize universal 16A continuous-use dimmer listed to UL508.
3. Limit current rise time to minimum 350 µsec as measured from 10-90 percent of load current waveform at full dimmer capacity at a 90 degree conduction angle.
4. Load faults only affect the given circuit.

2.5 LOW-VOLTAGE WALL STATIONS

A. Product: Revio, Ineo, European Style, Architrave, Touchscreens
B. Electronics:
1. Use CAN wiring for low voltage communication to ensure reliable data communication in high electrical noise environments.
C. Functionality:
1. Upon button press, LEDs to immediately illuminate.
D. Color:
1. Revio insert color can be specified by designer, or a .jpg picture file can be provided.
E. Provide faceplates with concealed mounting hardware where specified.
F. Engrave wall stations with appropriate button, zone, and scene descriptions as specified.
G. Silk-screened borders, logos, and graduations to use graphic process that chemically bonds graphics to faceplate, resistant to removal by scratching and cleaning.

2.6 LOW VOLTAGE CONTROL INTERFACES

A. Contact Closure Interfaces; Cooper iLumin UIG-NA:
1. Where contact closures are used to integrate between lighting controls and other systems.
2. The contact closure input device will accept both momentary and maintained contact closures.
B. RS232 Interface; Cooper iLumin RS232-NA:
1. RS232 Interface
    a. Provide ability for bi-direction communication by means of RS232 serial communication to system by means of user-supplied PC, digital audiovisual, or BMS equipment. Control to be located within 50 feet (15 meters) of RS232 source.
    b. Allow for custom RS-232 command strings to be entered in to software to allow lighting control system to control any other device.
C. Exterior Daylight Sensors:
1. Calibrated with independent turn-on and turn-off thresholds; minimum 2 foot-candles difference between the turn-on and turn-off thresholds.

2.7 SOURCE QUALITY CONTROL

A. Perform full-function testing on 100% of all system components and panel assemblies at the factory.

PART 3- EXECUTION

3.1 INSTALLATION

A. Install equipment in accordance with manufacturer's installation instructions.

B. Provide complete installation of system in accordance with Contract Documents.

C. Define each dimmer's/relay's load type, assign each load to a zone, and set control functions.

D. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.

E. Mount exterior daylight sensors to point due north with constant view of daylight.

1. 100 digital devices (Source Controllers, User Interfaces, etc) may reside on a single network segment with a network length not to exceed 3000 feet. Additional network segments shall be accomplished by the employment of a network bridge up to 65000 devices. Network segments shall be terminated at the end of each segment.
2. Devices to be connected via Daisy Chain topology.
3. Network wire recommended is Belden#1502R or 1502P (plenum) or similar. Wire shall meet color code requirements to insure proper installation of the network polarity.
4. All panels are "masters" and may be added to the network in any location and any amount as long as network installation guidelines are met.
5. Panels are designed to function independently from external control devices.

END OF SECTION

SECTION 26 24 00 - SWITCHBOARDS AND PANELBOARDS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Service And Distribution Switchboards Rated 600 V and Less.
2. Load Centers And Panelboards, Overcurrent Protective Devices, And Associated Auxiliary Equipment Rated 600 V and Less For The Following Types:
   a. Lighting and Appliance Branch-Circuit Panelboards.
   b. Distribution Panelboards.

B. Related Sections include the following:

1. Section 03 30 00 - Cast-In-Place Concrete.
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
3. Section 26 05 48 – Vibration and Seismic Controls for Electrical Work.
4. Section 26 05 53 – Identification for Electrical Systems.

1.02 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. RFI: Radio-frequency interference.

D. RMS: Root mean square.

E. SPDT: Single pole, double throw.

F. TVSS: Transient voltage surge suppressor.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for Project with the following supporting data:

1. Product Data:
   a. For each type of switchboard, panelboard, overcurrent protective device, TVSS device, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
2. Shop Drawings: For each switchboard, panelboard and related equipment.
   a. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
      1) Enclosure types and details for types other than NEMA 250, Type 1.
      2) Bus configuration, current, and voltage ratings.
      3) Short-circuit current rating of switchboards and overcurrent protective devices.
      4) Descriptive documentation of optional barriers specified for electrical insulation and isolation.
      5) Utility company's metering provisions with indication of approval by utility company.

6) UL listing for series rating of installed devices.

7) Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

b. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

3. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.

4. Field Test Reports: Submit written test reports and include the following:

a. Test procedures used.

b. Test results that comply with requirements.

c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

5. Manufacturer's field service report.

6. Updated mimic-bus diagram for switchboard reflecting field changes after final switchboard load connections have been made, for record.

7. Maintenance Data: For Switchboards, Panelboards and components to include in maintenance manuals specified in Division 01. In addition to requirements specified in Division 01 Section "Contract Closeout," include the following:

a. Routine maintenance requirements for switchboards and all installed components.

b. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

c. Time-current curves, including selectable ranges for each type of overcurrent protective device.

8. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency that is a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA PB 2 for switchboards.

D. Comply with NEMA PB1 for panelboards.

E. Comply with NFPA 70.

F. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards, including clearances between switchboards, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver in sections of lengths that can be moved past obstructions in delivery path.

B. Store indoors in clean dry space with uniform temperature to prevent condensation. Protect from exposure to dirt, fumes, water, corrosive substances, and physical damage.

C. Handle switchboards according to NEMA PB 2.1.

1.06 PROJECT CONDITIONS

A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.

B. Environmental Limitations: Rate equipment for continuous operation under the following, unless otherwise indicated:

1. Ambient Temperature: Not exceeding 104 deg F.

2. Altitude: Not exceeding 6600 feet.

1.07 COORDINATION

A. Coordinate layout and installation of switchboards, panelboards, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 03 30 00 (03300) "Cast-in-Place Concrete."

PART 2 PRODUCT

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Switchboards:

a. None.

2. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:

a. None.

B. Approved Manufacturers:

1. Switchboards:

a. Eaton Corp. Cutler-Hamer Products (800-4982678)

b. General Electric Co.: Electrical Distribution & Control Div (888-437-3765)

c. Siemens energy & Automation, Inc.. (800-967-4114)

d. Square D Co: a Division of Groupe Schneider (888-778-2733)

2. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:

a. Eaton Corp. Cutler-Hamer Products (800-4982678)

b. General Electric Co.: Electrical Distribution & Control Div (888-437-3765)

c. Siemens energy & Automation, Inc.. (800-967-4114)

d. Square D Co: a Division of Groupe Schneider (888-778-2733)

2.02 SWITCHBOARDS - MANUFACTURED UNITS

A. Front-Connected, Front-Accessible Switchboard Fixed, individually mounted main device, panel-mounted branches, and sections rear aligned.

B. Nominal System Voltage: 208 Y/120

C. Main-Bus Continuous: 2000

2.03 SWITCHBOARDS - FABRICATION AND FEATURES

A. Enclosure: Steel: NEMA 250, Type 3R.

B. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.

C. Barriers: Between adjacent switchboard sections.

D. Utility Metering Compartment: Fabricated compartment and section complying with utility company's requirements. If separate vertical section is required for utility metering, match and align with basic switchboard.

E. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

F. Hinged Front Panels: Allow access to circuit-breaker, metering, accessory, and blank compartments.

G. Buses and Connections: Three phase, four wire, unless otherwise indicated. Include the following features:

1. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivity or tin-plated, high-strength, electrical-grade aluminum alloy.

a. If bus is aluminum, use copper or tin-plated aluminum for circuit-breaker line connections.

b. If bus is copper, use copper for feeder circuit-breaker line connections.

2. Ground Bus: 1/4-by-3-inch minimum size, drawn-temper copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors. For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

3. Contact Surfaces of Buses: Silver plated.

4. Main Phase Buses, Neutral Buses, and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.

5. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.

6. Neutral Buses: 100 percent of the ampacity of the phase buses, unless otherwise indicated, equipped with pressure connectors for outgoing circuit neutral cables. Bus extensions for busway feeder neutral bus is braced.

H. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

I. Rated for 65,000 A.I.C. and service entranced rated.

2.04 SWITCHBOARDS - INSTRUMENTATION

A. Instrument Transformers: NEMA EI 21.1, IEEE C57.13, and the following:

1. Potential Transformers: Secondary voltage rating of 120 V and NEMA accuracy class of 0.3 with burdens of W, X, and Y.

2. Current Transformers: Ratios shall be as indicated with accuracy class and burden suitable for connected relays, meters, and instruments.

3. Control-Power Transformers: Dry type, mounted in separate compartments for units larger than 3 kV.

B. Ammeters, Voltmeters, and Power-Factor Meters: ANSI C39.1.

1. Meters: 4-inch diameter or 6 inches square, flush or semi-flush, with anti-parallax 250-degree scales and external zero adjustment.
2. Voltmeters: Cover an expanded-scale range of nominal voltage plus 10 percent.

C. Instrument Switches: Rotary type with off position.

1. Voltmeter Switches: Permit reading of all phase-to-phase voltages and, where a neutral is indicated, phase-to-neutral voltages.
2. Ammeter Switches: Permit reading of current in each phase and maintain current-transformer secondaries in a closed-circuit condition at all times.

D. Feeder Ammeters: 2-1/2-inch minimum size with 90- or 120-degree scale. Meter and transfer device with an off position, located on overcurrent device door for indicated feeder circuits only.

2.05 SWITCHBOARDS - CONTROL POWER

A. Control Circuits: 120 V, supplied through secondary disconnecting devices from control-power transformer.

B. Control-Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.

C. Control Wiring: Factory installed, with bundling, lacing, and protection included. Provide flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.

2.06 PANELBOARDS - FABRICATION AND FEATURES

A. Enclosures: Flush- and/or surface-mounted cabinets as indicated on drawings. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

1. Kitchen Areas: NEMA 250, Type 4X, stainless steel.

B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

C. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

D. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

E. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

F. Bus: Hard-drawn copper, 98 percent conductivity or tin-plated aluminum.

G. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.

H. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

I. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

J. Isolated Equipment Ground Bus: Adequate for branch-circuit equipment ground conductors; insulated from box.

K. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.

L. Gutter Barrier: Arrange to isolate individual panel sections.

M. Feed-through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.07 PANELBOARDS - SHORT-CIRCUIT RATING

A. UL label indicating series-connected rating with integral or remote upstream devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.

B. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.08 PANELBOARDS - LIGHTING AND APPLIANCE BRANCH-CIRCUITS

A. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.

B. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.09 PANELBOARDS - DISTRIBUTION

A. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with tumbler lock; keyed alike.

B. Main Overcurrent Protective Devices: Circuit breaker.

C. Branch overcurrent protective devices shall be one of the following:

1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in circuit breakers.

2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.10 LOAD CENTERS

A. Overcurrent Protective Devices: Plug-in, full-module circuit breaker.

B. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

2.11 SWITCHBOARD AND PANELBOARDS - OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:

a. Instantaneous trip.

b. Long- and short-time pickup levels.

c. Long- and short-time time adjustments.

d. Ground-fault pickup level, time delay, and I^2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.

5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.

6. GFCI Circuit Breakers: Single- and two-pole configurations with 30 -mA trip sensitivity.

B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.

2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

4. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.

5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.

2.12 ACCESSORY COMPONENTS AND FEATURES

A. Spare-Fuse Cabinet: Suitably identified, wall-mounted, lockable, compartmented steel box or cabinet. Arrange for wall mounting.

2.13 IDENTIFICATION

A. Mimic Bus for Switchboard: Continuously integrated mimic bus factory applied to front of switchboard. Arrange in single-line diagram format, using symbols and letter designations consistent with final mimic-bus diagram. Coordinate mimic-bus segments with devices in switchboard sections to which applied. Produce a concise visual presentation of principal switchboard components and connections.

B. Presentation Media: Painted graphics in color contrasting with equipment factory-finished background to represent bus and components, complete with lettered designations.

PART 3 EXECUTION

3.01 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

3.02 EXAMINATION

A. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION

A. Install switchboards and accessories according to NEMA PB 2.1.

B. Install panelboards and accessories according to NEMA PB 1.1

C. Support switchboards on concrete bases, 4-inch nominal thickness.

D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.

E. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.

F. Mounting of Panelboards: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

G. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

H. Install filler plates in unused spaces.

I. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.

J. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.04 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 26 05 53 (16075) "Identification for Electrical Systems".

B. Switchboard Nameplates: Label each switchboard compartment with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

C. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.05 CONNECTIONS

A. Install equipment grounding connections for switchboards with ground continuity to main electrical ground bus.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.06 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

B. Testing: After installing switchboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Sections 7.1, 7.5, 7.6, 7.9, 7.10, 7.11, and 7.14 as appropriate. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Infrared Scanning: Switchboard only. After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switchboard. Remove front panel so joints and connections are accessible to portable scanner.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switchboard 11 months after date of Substantial Completion.

2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

3. Record of Infrared Scanning: Prepare a certified report that identifies switchboards checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

D. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.

2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.

3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.

4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.07 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.08 CLEANING

A. On completion of installation, inspect interior and exterior of switchboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Receptacles, Connectors, Switches, And Finish Plates.

B. Related Sections:

1. Section 00 31 13.43 - Interior Finish Index
2. Section 26 05 53 – Identification for Electrical Systems.

1.02 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Maintenance Data: For materials and products to include in maintenance manuals specified in Division 01.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NEMA WD 1.

1. Comply with NFPA 70 "National Electric Code"

1.05 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

B. Device and coverplate colors, the electrical contractor shall coordinate with Architect final device color with room finishes.

C. All devices/coverplates in millwork/wood shall be black.

D. All devices in Public spaces shall be white device with brushed stainless steel coverplate, including the communal table millwork.

E. All devices/coverplates in guest suites shall be white.

1.06 EXTRA MATERIALS

A. Furnish extra materials described in Section 01790 (01 78 43) “Spare Parts and Materials” that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Receptacles, Switches and Wall Plates

2. Wiring Devices:
3. Pendant Cord and Connector Devices
4. Cord and Plug Sets
5. Multioutlet Assemblies:
    a. None.
6. Poke-through, Floor Service Outlets and Telephone/Power Poles:
    a. None.

B. Approved Manufacturers:

1. Receptacles, Switches and Wall Plates
2. Wiring Devices:
    a. GE Company; GE Wiring Devices (401-886-6200)
    b. Hubbell, Inc.; Wiring Devices Div. (203-882-4900)
    c. Killark Electric Manufacturing Co. (314-531-0460)
    d. Pass & Seymour/Legrand; Wiring Devices Div. (800-223-4185)
3. Pendant Cord and Connector Devices
    a. GE Company; GE Wiring Devices (401-886-6200)
    b. Hubbell, Inc.; Wiring Devices Div. (203-882-4900)
    c. Killark Electric Manufacturing Co. (314-531-0460)
    d. Pass & Seymour/Legrand; Wiring Devices Div. (800-223-4185)
4. Cord and Plug Sets
    a. GE Company; GE Wiring Devices (401-886-6200)
    b. Hubbell, Inc.; Wiring Devices Div. (203-882-4900)
    c. Killark Electric Manufacturing Co. (314-531-0460)
    d. Pass & Seymour/Legrand; Wiring Devices Div. (800-223-4185)
5. Multioutlet Assemblies:
    a. Airey-Thompson Co. (800-421-61969)
    b. Wiremold (800-621-0049)
6. Poke-through, Floor Service Outlets and Telephone/Power Poles:
    a. Hubbell, Inc.; Wiring Devices Div. (203-882-4900)
    b. Pass & Seymour/Legrand; Wiring Devices Div. (800-223-4185)
    c. Square D Co.; a Division of Groupe Schneider (888-778-2733)
    d. Wiremold. (800-621-0049)

2.02 RECEPTACLES

A. Straight Blade and Locking Type Recptacles: General duty grade, NEMA 5-20R duplex type.

B. GFCI Receptacles: Feed-through type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle arranged to protect connected downstream receptacles on same circuit. Design units for installation in a 2-3/4-inch- deep outlet box without an adapter.

C. Isolated-Ground Receptacles: Equipment grounding contacts connected only to the green grounding screw terminal of the device with inherent electrical isolation from mounting strap.

1. Devices: Listed and labeled as isolated-ground receptacles.

Isolation Method: Integral to receptacle construction and not dependent on removable parts.

D. All weatherproof receptacles shall be “GF” type and “WR” labeled.

2.03 SWITCHES

A. Rocker Switches and matching Receptacles:

1. Switches shall be 15 AMP; 120/277 VAC, side-wired with grounding screw similar to “Decora Devices” as manufactured by Leviton Manufacturing Co., Inc., or approved substitution by listed manufacturers.

2. Switch and matching cover plate that hides the screws:.

3. Where more than one switch occurs at the same location, they shall be ganged under one plate. Where space does not permit horizontal ganging, interchangeable type switches may be used, only with approval of the Owner’s Representative.

B. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible and electromagnetic noise filters.

1. Control: Continuously adjustable slide. Single-pole or three-way switch to suit connections.

2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable slide; single pole with soft tap or other quiet switch; electromagnetic filter to eliminate noise, RF, and TV interference; and 5-inch wire connecting leads.

3. Fluorescent Lamp Dimmers: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming to a maximum of 1 percent of full brightness, with filters to reduce audible noise, RF and TV interference.

C. Fireplace Timer Switch: Remote wall switch with 30-minute timer.

1. Timer to be Model 6260M by Leviton Manufacturing Co. Provide all required relays to coordinate gas log set valve (250 millivolts) with 120 voltage supplied to timer switch.

2.04 WALL PLATES

A. Single and combination types match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.

2. Provide plates for all devices and outlets with opening configuration suitable for devices to be covered.

3. Plates shall be smooth urea plastic secured in place with screws finsihed to match the plates. Back of the house areas, such as equipment spaces, shall have steel plates. Stainless steel plates shall be used in kitchens. Weatherproof plates shall be used where exposed to the weather or in pool area.

4. Color:

a. White At Buffet wall areas:

1) Black devices.

2) Stainless Steel cover plates.

b. Color of devices shall match cover plates.

c. PENDANT CORD/CONNECTOR DEVICES

B. Description: Matching, locking type, plug and receptacle body connector, NEMA WD 6, Configurations L5-20P and L5-20R, Heavy-Duty grade.

1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.

2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.05 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber-insulated, stranded-copper conductors, with type SOW-A jacket. Green-insulated grounding conductor, and equipment-rating ampacity plus a minimum of 30 percent.

2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.06 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartmentation: Barrier separates power and signal compartments.

C. Housing Material: Die-cast aluminum, satin finished.

D. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.

E. Signal Outlet: Blank cover with bushed cable opening, unless otherwise indicated.

2.07 POKE-THROUGH ASSEMBLIES

A. Description: Factory-fabricated and -wired assembly of below-floor junction box unit with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.

1. Size: Selected to fit nominal 3-inch cored holes in floor and matched to floor thickness.

2. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.

3. Closure Plug: Arranged to close unused 3-inch cored openings and reestablish fire rating of floor.

4. Wiring: Three No. 12 AWG power and ground conductors; one 75-ohm coaxial telephone/data cable; and one four-pair, 75-ohm telephone/data cable.

2.08 MULTIOUTLET ASSEMBLIES

A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

B. Raceway Material: Metal, with manufacturer's standard finish.

C. Wire: No. 12 AWG.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install devices and assemblies plumb and secure.

B. Protect devices and assemblies during painting. Install wall plates when painting is complete.

C. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.

D. Do not share neutral conductor on load side of dimmers.

E. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

F. Adjust locations at which floor service outlets and telephone/power service poles are installed to suit arrangement of partitions and furnishings.

3.02 IDENTIFICATION

A. Comply with Section 26 05 53 (16075) "Identification for Electrical Systems."

1. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.

2. Receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

3.03 CONNECTIONS

A. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.

B. Isolated-Ground Receptacles: Connect to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.

C. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.

B. Check TVSS receptacle indicating lights for normal indication.

C. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

D. Replace damaged or defective components.

3.05 CLEANING

A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Individually Mounted Switches and Circuit Breakers Used for the following:

a. Service Disconnect Switches.

b. Feeder And Equipment Disconnect Switches.

c. Feeder Branch-Circuit Protection.

d. Motor Disconnect Switches.

B. Related Sections:

1. Section 26 05 19 (16490) - Low-Voltage Electrical Power Conductors and Cables: For fuses in fusible disconnect switches.

2. Section 26 05 53 (16075) - Identification for Electrical Systems.

3. Section 26 24 00 (16440) - Switchboards and Panelboards: For individually enclosed, fused power-circuit devices used as feeder disconnect switches.

4. Section 26 27 26 (16140) - Wiring Devices: For attachment plugs and receptacles, and snap switches used for disconnect switches.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. Descriptive data and time-current curves.

b. Let-through current curves for circuit breakers with current-limiting characteristics.

c. Coordination charts and tables and related data.

2. Wiring diagrams detailing wiring for power and control systems and differentiating between manufacturer-installed and field-installed wiring.

3. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of owners representative and owners, and other information specified.

4. Field test reports indicating and interpreting test results.

5. Maintenance data for tripping devices to include in the operation and maintenance manual specified in Division 01.

1.03 QUALITY ASSURANCE

A. Testing Agency Qualifications: In addition to the requirements specified in Section 01 45 00 - "Quality Control," an independent testing agency shall meet OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907, or shall be a full member company of the InterNational Electrical Testing Association (NETA).

1. Testing Agency's Field Supervisor: Person currently certified by NETA or the National Institute for Certification in Engineering Technologies, to supervise on-site testing specified in Part 3.

B. Source Limitations: Obtain disconnect switches and circuit breakers from one source and by a single manufacturer.

C. Comply with NFPA 70 for components and installation.

D. Listing and Labeling: Provide disconnect switches and circuit breakers specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Disconnect Switches:

a. None

2. Fusible Switches:

a. None

3. Molded-Case Circuit Breakers:

a. None

4. Combination Circuit Breaker and Ground Fault Trip:

a. None

5. Molded-Case, Current-Limiting Circuit Breakers:

a. None

B. Approved Manufacturers:

1. Disconnect Switches:

a. General Electric Co.; Electrical Distribution and Control Division (888-437-3765)

b. Siemens Energy & Automation, Inc. (800-964-4114)

c. Square D Co.; a Division of Groupe Schneider (888-778-2733)

d. Eaton Corp. Cutler-Hammer Products (800-498-2678)

2. Fusible Switches:

a. General Electric Co.; Electrical Distribution and Control Division (888-437-3765)

b. Siemens Energy & Automation, Inc. (800-964-4114)

c. Square D Co.; a Division of Groupe Schneider (888-778-2733)

d. Eaton Corp. Cutler-Hammer Products (800-498-2678)

3. Molded-Case Circuit Breakers:

a. General Electric Co.; Electrical Distribution and Control Division (888-437-3765)

b. Siemens Energy & Automation, Inc. (800-964-4114)

c. Square D Co.; a Division of Groupe Schneider (888-778-2733)

d. Eaton Corp. Cutler-Hammer Products (800-498-2678)

4. Combination Circuit Breaker and Ground Fault Trip:
    a. General Electric Co.; Electrical Distribution and Control Division (888-437-3765)
    b. Siemens Energy & Automation, Inc. (800-964-4114)
    c. Square D Co.; a Division of Groupe Schneider (888-778-2733)
    d. Eaton Corp. Cutler-Hammer Products (800-498-2678)
5. Molded-Case, Current-Limiting Circuit Breakers:
    a. General Electric Co.; Electrical Distribution and Control Division (888-437-3765)
    b. Siemens Energy & Automation, Inc. (800-964-4114)
    c. Square D Co.; a Division of Groupe Schneider (888-778-2733)
    d. Eaton Corp. Cutler-Hammer Products (800-498-2678)

2.02 DISCONNECT SWITCHES

A. Enclosed, Non-fusible Switch: NEMA KS 1, Type HD, with lockable handle.

B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with 2 padlocks, and interlocked with cover in CLOSED position.

C. Enclosure: NEMA KS 1, Type 1, unless otherwise specified or required to meet environmental conditions of installed location.
    1. Outdoor Locations: Type 3R.
    2. Kitchen Areas: Type 4X, stainless steel.
    3. Other Wet or Damp Indoor Locations: Type 4.

2.03 ENCLOSED CIRCUIT BREAKERS

A. Enclosed, Molded-Case Circuit Breaker: NEMA AB 1, with lockable handle.

B. Characteristics: Frame size, trip rating, number of poles, and auxiliary devices as indicated and interrupting rating to meet available fault current.

C. Application Listing: Appropriate for application, including switching fluorescent lighting loads or heating, air-conditioning, and refrigerating equipment.

D. Circuit Breakers, 200 A and Larger: Trip units interchangeable within frame size.

E. Circuit Breakers, 400 A and Larger: Field-adjustable, short-time and continuous-current settings.

F. Current-Limiting Trips: Where indicated, let-through ratings less than NEMA FU 1, Class RK-5.

G. Current Limiters: Where indicated, integral fuse listed for circuit breaker.

H. Lugs: Mechanical lugs and power-distribution connectors for number, size, and material of conductors indicated.

I. Shunt Trip: Where indicated.

J. Accessories: On drawings.

K. Enclosure: NEMA AB 1, Type 1, unless otherwise specified or required to meet environmental conditions of installed location.
    1. Outdoor Locations: Type 3R.

2. Kitchen Areas: Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: Type 4.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install disconnect switches and circuit breakers in locations as indicated, according to manufacturer's written instructions.

B. Install disconnect switches and circuit breakers level and plumb.

C. Install wiring between disconnect switches, circuit breakers, control, and indication devices.

D. Connect disconnect switches and circuit breakers and components to wiring system and to ground as indicated and instructed by manufacturer.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

E. Identify each disconnect switch and circuit breaker according to requirements specified in Section 26 05 53 (16075) - "Electrical Identification."

3.02 FIELD QUALITY CONTROL

A. Testing: After installing disconnect switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.5 for disconnect switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.

B. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

3.03 ADJUSTING

A. Set field-adjustable disconnect switches and circuit-breaker trip ranges as indicated or as directed in coordination study report.

3.04 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, and abrasions.

END OF SECTION

SECTION 26 29 13 - ENCLOSED CONTROLLERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. AC Motor-Control Devices Rated 600 V and Less that are Supplied As Enclosed Units.

a. Manual Motor Controllers

b. Magnetic Motor Controllers

c. Variable-Frequency Controllers

d. Enclosed Timer Switches

e. Enclosures

B. Related Sections include the following:

1. Section 03 30 00 (03300) - Cast-In-Place Concrete.

2. Section 26 05 00 (16050) – Common Work Results for Electrical: For general materials and installation methods.

3. Section 26 05 19 (16120) - Low-Voltage Electrical Power Conductors and Cables.

4. Section 26 05 53 (16075) – Identification for Electrical Systems.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in project with the following supporting data:

1. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

2. Maintenance Data: For products to include in the maintenance manuals specified in Division 01.

3. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

4. Qualification Data for Field Testing Agency: Certificates, signed by Contractor, certifying that agency complies with requirements specified in "Quality Assurance" Article below.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain similar motor-control devices through one source from a single manufacturer.

B. Comply with NFPA 70.

C. Listing and Labeling: Provide motor controllers specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

1.04 COORDINATION

A. Coordinate features of controllers and accessory devices with pilot devices and control circuits to which they connect.

B. Coordinate features, accessories, and functions of each motor controller with the ratings and characteristics of the supply circuit, the motor, the required control sequence, and the duty cycle of the motor and load.

1.05 EXTRA MATERIALS

A. Furnish extra materials described in Section 01 78 43 (01790) “Spare Parts and Material” that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents. Deliver extra materials to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

1. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary (888-385-1221)
2. Allen-Bradley Co.; Industrial Control Group (414-382-2000)
3. Crouse-Hinds ECM.; Cooper Industries, Inc. Div. (315-477-5531)
4. Eaton Corp.; Westinghouse & Cutler-Hammer Products (800-386-1911)
5. General Electric Co.; Electrical Distribution & Control Div. (888-437-3765)
6. Siemens Energy & Automation, Inc. (800-964-4114)
7. Square D Co.; a Division of Groupe Schneider (888-778-2733)

2.02 MANUAL MOTOR CONTROLLERS

A. Description: NEMA ICS 2, general purpose, Class A with toggle action and overload element.

2.03 MAGNETIC MOTOR CONTROLLERS

A. Description: NEMA ICS 2, Class A, full voltage, non-reversing, across the line, unless otherwise indicated.

B. Control Circuit: 120 V; obtained from integral control power transformer, unless otherwise indicated. Include a control power transformer with adequate capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

C. Combination Controller: Factory-assembled combination controller and disconnect switch with or without overcurrent protection as indicated.

1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses indicated. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a Nationally Recognized Testing Laboratory.
2. Non-fusible Disconnect: NEMA KS 1, heavy-duty, non-fusible switch.
3. Circuit-Breaker Disconnect: NEMA AB 1, motor-circuit protector with field-adjustable short-circuit trip coordinated with motor locked-rotor amperes.

D. Overload Relay: Ambient-compensated type with inverse-time-current characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect, and with appropriate adjustment for duty cycle.

2.04 ENCLOSURES

A. Description: Flush or surface-mounted cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.05 ACCESSORIES

A. Devices are factory installed in controller enclosure, unless otherwise indicated.

B. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

C. Stop and Lockout Push-Button Station: Momentary-break push-button station with a factory-applied hasp arranged so a padlock can be used to lock push button in depressed position with control circuit open.

D. Control Relays: Auxiliary and adjustable time-delay relays.

E. Elapsed Time Meters: Heavy duty with digital readout in hours.

F. Phase-Failure and Undervoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection. Provide adjustable undervoltage setting.

G. Impulse sparkover voltage coordinated with system circuit voltage.

H. Factory mounted with Nationally Recognized Testing Laboratory listed and labeled mounting device.

PART 3 EXECUTION

A. Select features of each motor controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.

B. Select horsepower rating of controllers to suit motor controlled.

C. Use fractional-horsepower manual controllers for single-phase motors, unless otherwise indicated.

D. Use manual controllers for 3-phase motors up to 7-1/2 hp not requiring automatic or remote control.

E. Push-Button Stations: In covers of magnetic controllers for manually started motors where indicated, start contact connected in parallel with sealing auxiliary contact for low-voltage protection.

F. Hand-Off-Automatic Selector Switches: In covers of manual and magnetic controllers of motors started and stopped by automatic controls or interlocks with other equipment.

3.02 INSTALLATION

A. Install independently mounted motor-control devices according to manufacturer's written instructions.

B. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components, including the pretesting and adjustment of solid-state controllers.

C. Location: Locate controllers within sight of motors controlled.

D. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks conforming to Section 26 05 00 - "Common Work Results for Electrical."

E. Install freestanding equipment on concrete housekeeping bases conforming to Section 03 30 00 - "Cast-in-Place Concrete."

F. Motor-Controller Fuses: Install indicated fuses in each fusible switch.

3.03 IDENTIFICATION

A. Identify motor-control components and control wiring according to Section 26 05 53 "Electrical Identification."

3.04 CONTROL WIRING INSTALLATION

A. Install wiring between motor-control devices according to Section 26 05 19 “Low-Voltage Electrical Power Conductors and Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect hand-off-automatic switch and other automatic control devices where available.

1. Connect selector switches to bypass only the manual and automatic control devices that have no safety functions when switch is in the hand position.

2. Connect selector switches with motor-control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.05 CONNECTIONS

A. Tighten connectors, terminals, bus joints, and mountings. Tighten field-connected connectors and terminals, including screws and bolts, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.06 FIELD QUALITY CONTROL

A. Testing: After installing motor controllers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Sections 7.5, 7.6, and 7.16. Certify compliance with test parameters.

2. Remove and replace malfunctioning units with new units, and retest.

3.07 CLEANING

A. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally, using methods and materials recommended by manufacturer.

3.08 DEMONSTRATION

A. Training: Engage a factory-authorized service representative to demonstrate solid-state and variable- speed controllers and train Owner's maintenance personnel.

1. Conduct training as specified in Section 01 79 00 - "Training”.

2. Include training relating to equipment operation and maintenance procedures.

END OF SECTION

SECTION 26 35 33 - POWER FACTOR CORRECTION EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Transient Voltage Surge Suppressors for Low-Voltage Power, Control, and Communication Equipment.

a. Service Entrance Suppressors

b. Plug-In Surge Suppressors

c. Control And Data Terminals

d. Enclosures

B. Related Sections:

1. Section 26 24 00 – Switchboards and Panelboards: For factory-installed transient voltage surge suppressors.

2. Section 26 24 26 - Wiring Devices: For devices with integral transient voltage surge suppressors.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project and with the following supporting data:

1. Product Certificates: Signed by manufacturers of transient voltage suppression devices, certifying that products furnished comply with the following testing and labeling requirements:

a. UL 1283 certification.

b. UL 1449 listing and classification.

2. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:

a. Test procedures used.

b. Test results that comply with requirements.

c. Failed test results and corrective action taken to achieve requirements.

3. Maintenance Data: For transient voltage suppression devices to include in maintenance manuals specified in Division 01.

4. Warranties: Special warranties specified in this Section.

1.03 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies, to supervise on-site testing specified in Part 3.

B. Source Limitations: Obtain suppression devices and accessories through one source from a single manufacturer.

C. Product Options: Drawings indicate size, dimensional requirements, and electrical performance of suppressors and are based on the specific system indicated.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. IEEE Compliance: Comply with IEEE C62.41, "IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits," and test devices according to IEEE C62.45, "IEEE Guide for Surge Suppressor Testing."

F. NEMA Compliance: Comply with NEMA LS 1, "Low Voltage Surge Protective Devices."

G. UL Compliance: Comply with UL 1283, "Electromagnetic Interference Filters," and UL 1449, "Transient Voltage Surge Suppressors."

1.04 PROJECT CONDITIONS

A. Placing into Service: Do not energize or connect service entrance equipment to their sources until the surge protective devices are installed and connected.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner representative not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Owner's representative written permission.

C. Service Conditions: Rate surge protective devices for continuous operation under the following conditions, unless otherwise indicated:

1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.

2. Operating Temperature: 30 to 120 deg F.

3. Humidity: 0 to 85 percent, non-condensing.

4. Altitude: Less than 20,000 feet above sea level.

1.05 COORDINATION

A. Coordinate location of field-mounted surge suppressors to allow adequate clearances for maintenance.

1.06 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of surge suppressors that fail in materials or workmanship within five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Broad Line of Suppressors:

a. None

2. Category A and Telephone/Data Line Suppressors:

a. None

B. Approved Manufacturers:

1. Broad Line of Suppressors:

a. Current Technology, Inc. (800-238-5000)

b. Liebert Corp. (614-888-0246)

c. Square D Co.; a Division of Group Schneider (888-778-2733)

2. Category A and Telephone/Data Line Suppressors:

a. MCG Electronics, Inc. (800-851-1508)

b. NTE Electronics, Inc. (973-748-5089)

c. Telebyte Technology, Inc. (800-835-3298)

2.02 SERVICE ENTRANCE SUPPRESSORS

A. Surge Protective Device Description: Modular design with field-replaceable modules and the following features and accessories:

1. Fuses, rated at 200-kA interrupting capacity.

2. Fabrication using bolted compression lugs for internal wiring.

3. Integral disconnect switch.

4. Redundant suppression circuits.

5. Redundant replaceable modules.

6. Arrangement with wire connections to phase buses, neutral bus, and ground bus.

7. Red and green LED indicator lights for power and protection status.

8. Audible alarm, with silencing switch, to indicate when protection has failed.

9. One set of dry contacts rated at 5 a and 250-V ac, for remote monitoring of protection status. Coordinate with building power monitoring and control system.

10. Surge-event operations counter.

B. Peak Single-Impulse Surge Current Rating: kA per phase.

C. Connection Means: Permanently wired.

D. Protection modes and UL 1449 clamping voltage for grounded wye circuits with voltages of 208Y/120, 3-phase, 4-wire circuits, shall be as follows:

1. Line to Neutral: 400 V for 208Y/120.

2. Line to Ground: 400 V for 208Y/120.

3. Neutral to Ground: 400 V for 208Y/120.

E. Protection modes and UL 1449 clamping voltage for voltages of 240, or 600; 3-phase, 3-wire, delta circuits shall be as follows:

1. Line to Line: 1000 V for 240 V.

2. Line to Ground: 1000 V for 240 V.

2.03 PLUG-IN SURGE SUPPRESSORS

A. Description: Non-modular, plug-in suppressors with at least four 15-A, 120-V ac, NEMA WD 6, Configuration 15-15R receptacles, suitable to plug into a NEMA WD 6, Configuration 15-15R receptacle; with the following features and accessories:

1. LED indicator lights for power and protection status.
2. LED indicator lights for reverse polarity and open outlet ground.
3. Circuit breaker and thermal fusing. Unit continues to supply power if protection is lost.
4. Close-coupled direct plug-in.
5. Rocker-type on-off switch, illuminated when in the on position.
6. One RJ11/12C telephone line protector, suitable for modem connection. Maximum clamping voltage 220 peak on pins No. 3 and 4.

B. Peak Single-Impulse Surge Current Rating: 13 kA per phase.

C. Protection modes and UL 1449 clamping voltage shall be as follows:

1. Line to Neutral: 475 V.
2. Line to Ground: 475 V.
3. Neutral to Ground: 475 V.

2.04 CONTROL AND DATA TERMINALS

A. Protectors for copper control, data, antenna and telephone conductors entering the building from the outside shall be as recommended by the manufacturer for the type of line being protected.

2.05 ENCLOSURES

A. NEMA 250, with type matching the enclosure of panel or device being protected.

PART 3 EXECUTION

3.01 INSTALLATION OF SURGE PROTECTIVE DEVICES

A. Install devices at service entrance on load side, with ground lead bonded to service entrance ground.

B. Install devices for panelboard and auxiliary panels with conductors between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

1. Provide multi-pole, 15-A circuit breaker as a dedicated disconnect for the suppressor, unless otherwise indicated.

3.02 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing surge protective devices, but before electrical circuitry has been energized, test for compliance with requirements.
2. Complete startup checks according to manufacturer's written instructions.
3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 07.19. Certify compliance with test parameters.

B. Repair or replace malfunctioning units. Retest after repairs or replacements are made.

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain surge protective devices.

1. Train Owner's maintenance personnel on procedures and schedules for maintaining suppressors.

2. Review data in maintenance manuals. Refer to Section 01 78 23 - "Operation and Maintenance Data."

3. Schedule training with Owner, through Owner representative, with at least seven days' advance notice.

END OF SECTION

SECTION 26 41 13 - LIGHTNING PROTECTION FOR STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Lightning Protection System for Buildings and Associated Structures

B. Related Sections:

1. Section 07 61 00 - Sheet Metal Roofing
2. Section 26 05 00 – Common Work Results for Electrical
3. Section 26 05 26 - Grounding and Bonding for Electrical Systems

1.02 SYSTEM DESCRIPTION

A. Lightning Protection System to protect entire building.

1.03 SUBMITTALS

A. Product Data:

1. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in project.

B. Product Data for each component specified. Include the following:

C. Shop Drawings detailing lightning protection system. Include air terminal locations, conductor routing and connections, and bonding and grounding provisions. Include indications for use of raceway and data on how concealment requirements will be met.

D. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include data on listing or certification by nationally recognized testing laboratory (NRTL) or trade association. Include lists of completed projects with project names and addresses, names and addresses of owner's representative and owners, and other information specified.

E. Certification, signed by Contractor, that roof adhesive for air terminals is approved by manufacturers of both the terminal assembly and the single-ply membrane roofing material.

F. Field inspection reports indicating compliance with specified requirements.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is NRTL listed or who is certified by the Lightning Protection Institute as a Master Installer/Designer.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Provide UL Master Label.

1.05 SEQUENCING AND SCHEDULING

A. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

1. A-C Lightning Security, Inc. (800-821-5575)
2. Approved Lightning Protection Co., Inc. (631-643-6327)
3. Harger Lightning Protection, Inc. (800-842-7437)
4. Heary Bros. Lightning Protection Co. (800-421-6141)
5. Independent Protection Co., Inc. (800-860-8388)
6. Robbins Lightning, Inc. (800-426-3792)
7. Thompson Lightning Protection Co. (651-455-7661)
8. West Dodd Lightning Conductor Corp. (219-533-5370)

2.02 LIGHTNING PROTECTION SYSTEM COMPONENTS

A. Comply with UL 96.

B. System Materials: Copper, with solid air terminals, except as otherwise indicated.

C. Air Terminals for Single-Ply Membrane Roof Mounting: Units with bases especially designed for single-ply membrane roof materials.

D. Air Terminal Decorations: Decorative ball, direction vane, and compass set where indicated.

E. Air Terminals for Main Stack: Stainless steel.

F. Ground Rods: Copper-clad steel with a minimum of 27 percent of rod weight in copper cladding.

1. Diameter: 3/4 inch
2. Length: 10 feet

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces, areas, and conditions, with Installer present, for compliance with installation tolerances and other conditions affecting performance of lightning protection. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install lightning protection as indicated, according to manufacturer's written instructions.

B. Comply with UL 96A and LPI-175.

C. Conform to the most stringent requirements when more than one standard is specified.

D. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends and narrow loops. Where indicated, run conductors in nonmetallic raceway, Schedule 40, minimum.

E. Conceal down conductors.

F. Conceal interior conductors.

G. Conceal conductors from normal view from exterior locations at grade within 200 feet of building.

H. Provide notification to Owner's Representative a minimum of 48 hours prior to concealing lightning protection components.

I. Cable Connections: Use approved exothermic-welded connections for all conductor splices and connections between conductors and other components except those above single-ply membrane roofing.

J. Air Terminals on Single-Ply Membrane Roofing: Comply with adhesive manufacturer's installation instructions.

K. Bond extremities of vertical metal bodies exceeding 60 feet in length to lightning protection components.

L. Bond ground terminals to counterpoise conductor.

M. Bond grounded metal bodies on building within 12 feet of ground to counterpoise conductor.

N. Bond grounded metal bodies on building within 12 feet of roof to counterpoise conductor.

O. Bond lightning protection components to grounded metal bodies on building at every 60 feet with intermediate-level interconnection loop conductors.

3.03 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.

B. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

3.04 FIELD QUALITY CONTROL

A. Periodic Inspections: Provide the services of a qualified inspector to perform periodic inspections during construction and at its completion, according to LPI-177.

B. UL Inspection: Apply for inspection by UL as required for UL master labeling of system.

END OF SECTION

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior Lighting Fixtures
2. Lamps
3. Ballasts
4. Exit Signs
5. Emergency Lighting Units
6. Accessories

B. Related Sections:

1. Section 00 21 00 – Allowances
2. Section 00 41 13 - Bid Form
3. Section 00 43 10 – Break Out Pricing
4. Section 09 51 23 - Acoustical Tile Ceilings
5. Section 26 05 00 - Common Work Results For Electrical.
6. Section 26 56 00 - Exterior Lighting
7. Section 26 60 00 - Lighting Accessories: For programmable lighting control systems, time switches, additional photoelectric relays, power relays, and contactors.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. For each type of lighting fixture indicated, arranged in order of fixture designation. Include data on features, accessories, and the following:
   a. Dimensions of fixtures.
   b. Certified results of laboratory tests for fixtures and lamps for photometric performance.
   c. Emergency lighting unit battery and charger.
   d. Fluorescent and high-intensity-discharge ballasts.
   e. Types of lamps.
   f. Photometric data.
2. Dimming Ballast Compatibility Certificates: Signed by manufacturer of ballast certifying that ballasts are compatible with dimming systems and equipment with which they are used.
3. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
4. Maintenance Data: For lighting fixtures to include in maintenance manuals specified in Division 01.

1.03 QUALITY ASSURANCE

A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NFPA 70.

C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.04 COORDINATION

A. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.

1.05 EXTRA MATERIALS

A. Furnish extra materials described in Section 01 78 43 (01790) “Spare Parts and Materials” that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Subject to compliance with requirements, provide the products indicated for each designation in the Light Fixture Matrix attached at the end of this Section.
2. None.

B. Approved Manufacturers:

1. Subject to compliance with requirements, provide the products indicated for each designation in the Light Fixture Matrix attached at the end of this Section.
2. 2nd Avenue Design (800-843-1602)
   a. Contact: Jan Zanger (800-544-4879)
3. Ashley Lighting Inc. (870-483-6184)
   a. Contact: David Burn (703-461-4780)
4. Challenger Lighting Company (847-717-4700)
   a. Contact: Peggy Hart (301-260-2161 x 13)
5. ExceLine, a Philips Group Brand (800-334-2212)
   a. Contact: Kathleen Kenny (813-760-3421)
6. Forecast, a Philips Group Brand (847-622-0416)
   a. Contact: Kathleen Kenny (813-760-3421)
7. General Electric Lighting Company (800-435-4448)
8. Hadco, a Philips Group Brand (800-331-4185)
   a. Contact: Kathleen Kenny (813-760-3421)
9. Insight Lighting Inc. (262.524.2010)
   a. Contact: Jerry Schneider (301-470-3282)
10. Kichler Lighting (866-558-5706)
    a. Contact: Peggy Hart (301-260-2161 x 13)
11. LBL Lighting, a Generation Brands Company (847-626-6304)

a. Contact: Joe Krause (301-537-5808)

12. Lightolier, a Philips Group Brand (508-679-8131)
    a. Contact: Kathleen Kenny (813-760-3421)
13. Lyte Poles Incorporated (586-774-5650)
    a. Contact: Kathleen Kenny (813-760-3421)
14. Lumark Lighting, Division of Cooper Industries Company (770-486-4800)
    a. Contact: Mike Larkin
15. Luminis Inc. (954-717-4155)
16. MP Lighting (604-708-1184)
    a. Contact: New Design Light (410-712-0239)
17. Pacific Coast Lighting (800-709-9004)
    a. Contact: Bruce Wowk (301-916-5588)
18. Panasonic (866-292-7292)
19. Philips Lighting Company (800.555.0050)
    a. Contact: Kathleen Kenny (813-760-3421)
20. Progress Lighting (864.599.6000)
    a. Contact: Jason Bak (864-599-6133)
21. Scott Lamp Company (707-864-2066)
    a. Contact: Bruce Wowk (301-916-5588)
22. Stonco Lighting, a Philips Group Brand (800-334-2212)
    a. Contact: Kathleen Kenny (813-760-3421)
23. TCP, Inc. (800-324-1496)
    a. Contact: Kip Sherwood (330-995-1359)
24. Tech Lighting, a Generation Brands Company (847-410-4400)
25. Contact: Nicole Justian (847-410-4549)(707-996-6906)
    a. Contact: Kathleen Kenny (813-760-3421)
26. Trend Lighting, a McFadden Lighting Company (314 773-1340)
    a. Contact: Rob Bruck (626-480-8880)
27. Trinity Lighting Inc. (870-972-1177)
    a. Contact: Heather McCarty (301-788-1290)
28. Unilight (800-361-0472)
    a. Contact: Kim Fontan (301-523-0070
29. Wide-Lite, a Philips Group Brand (512.392.5821)
    a. Contact: Kathleen Kenny (813-760-3421)
30. Wilshire Manufacturing Company, USA (508-824-1970)
31. Approved Substitution.

2.02 FIXTURES AND FIXTURE COMPONENTS, GENERAL

A. Metal Parts: Free from burrs, sharp corners, and edges.

B. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in operating position.

D. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.
4. Laminated Silver Metallized Film: 90 percent.

E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.

1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
2. Lens Thickness: 0.125 inch minimum, unless greater thickness is indicated.

2.03 FLUORESCENT LAMP BALLASTS

A. General Requirements: Unless otherwise indicated, features include the following:

1. Designed for type and quantity of lamps indicated at full light output.
2. Total Harmonic Distortion Rating: Less than 20 percent.
3. Sound Rating: A.

B. Electronic Ballasts for Linear Lamps: Unless otherwise indicated, features include the following, besides those in "General Requirements" Paragraph above:

1. Certified Ballast Manufacturer Certification: Indicated by label.
2. Encapsulation: Without voids in potting compound.
3. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.

C. Ballasts for Compact Lamps in Recessed Fixtures: Unless otherwise indicated, additional features include the following:

1. Type: Electronic fully encapsulated in potting compound.
2. Power Factor: 90 percent, minimum.
3. Operating Frequency: 20 kHz or higher.
4. Flicker: Less than 5 percent.
5. Lamp Current Crest Factor: Less than 1.7.
6. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.

D. Ballasts for Dimmer-Controlled Fixtures: Comply with general and fixture-related requirements above for electronic ballasts.

1. Compatibility: Certified by manufacturer for use with specific dimming system indicated for use with each dimming ballast.

E. Ballasts for Low-Temperature Environments: As follows:

1. Temperatures 0 Deg F Above: Electronic or electromagnetic type rated for 0 deg F starting temperature.

2. Temperatures Minus 20 Deg F and Above: Electromagnetic type designed for use with high-output lamps.

2.04 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

A. General: Comply with ANSI C82.4. Unless otherwise indicated, features include the following:

1. Type: Constant wattage autotransformer or regulating high-power-factor type, unless otherwise indicated.

2. Operating Voltage: Match system voltage.

3. Minimum Starting Temperature: Minus 22 deg F for single lamp ballasts.

4. Normal Ambient Operating Temperature: 104 deg F

5. Open-circuit operation that will not reduce average life.

6. Auxiliary, Instant-on, Quartz System: Automatically switches quartz lamp on when fixture is initially energized and when momentary power outages occur. Automatically turns quartz lamp off when high-intensity-discharge lamp reaches approximately 60 percent light output.

2.05 EXIT SIGNS

A. General Requirements: Comply with UL 924 and the following:

1. Sign Colors and Lettering Size: Comply with authorities having jurisdiction.

B. Internally Lighted Signs: As follows:

1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum rated lamp life.

C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.

2. Charger: Fully automatic, solid-state type with sealed transfer relay.

3. Operation: Relay automatically energizes lamp from unit when circuit voltage drops to 80 percent of nominal or below. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.

2.06 EMERGENCY LIGHTING UNITS

A. General Requirements: Self-contained units. Comply with UL 924. Units include the following features:

1. Battery: Sealed, maintenance-free, lead-acid type with minimum 10-year nominal life and special warranty.

2. Charger: Fully automatic, solid-state type with sealed transfer relay.

3. Operation: Relay automatically turns lamp on when supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.

4. Integral Time-Delay Relay: Arranged to hold unit on for fixed interval after restoring power after an outage. Provides adequate time delay to permit high-intensity-discharge lamps to restrike and develop adequate output.

2.07 LAMPS

A. Fluorescent Color Temperature and Minimum Color-Rendering Index: 3500 K and 85 CRI, unless otherwise indicated.

B. Non-compact Fluorescent Lamp Life: Rated average is 20,000 hours at 3 hours per start when used on rapid-start circuits.

C. Metal-Halide Color Temperature and Minimum Color-Rendering Index: 3600 K and 70 CRI, unless otherwise indicated.

2.08 FIXTURE SUPPORT COMPONENTS

A. Comply with Section 26/27 05 00 (16050) "Basic Electrical Materials and Methods," for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.

D. Rod Hangers: 3/16-inch- minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

F. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.

2.09 FINISHES

A. Fixtures: Manufacturer's standard, unless otherwise indicated.

1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.

2. Metallic Finish: Corrosion resistant.

3. Colors as indicated in Light Fixture Matrix.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.

B. Support for Fixtures in or on Grid-Type Suspended Ceilings:

1. Recessed lighting fixtures shall be supported independently from the suspended ceiling system. Number 8 gauge galvanized steel wire or approved type hangers from the overhead building structures shall be provided for fixture support.

C. Suspended Fixture Support: As follows:

1. Pendants and Rods: Where longer than 48 inches brace to limit swinging.

2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3. Continuous Rows: Suspend from cable installed according to fixture manufacturer's written instructions and details on Drawings.

3.02 CONNECTIONS

A. Ground Equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Advance Notice: Give dates and times for field tests.

C. Provide instruments to make and record test results.

D. Tests: As follows:

1. Verify normal operation of each fixture after installation.

2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation.

3. Verify normal transfer to battery source and retransfer to normal.

4. Report results in writing.

E. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

F. Corrosive Fixtures: Replace during warranty period.

3.04 CLEANING AND ADJUSTING

A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.

B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION

Light Fixture Matrix

SpringHill Suites

Gen 4 - New Build - A.I.R.

Universal Mark	I.D. X-Ref	Product	Manufacturer	Model No.	Size	Fixture Description	Lens	Mount	Lamp Type	Qty.	Lamp Model No. / Mecury Content	Volts	Fixture Watts (Max)	Gen / Decor Scheme	Area	Location
C01		Controls	Lightolier - A Philips Group	Architectural Lighting Control System (Lytemode) to include: * Touch Screen Master Station * Mini Master Control Stations * IGBT Dimmer Module * Optio Dimmer Cabinet (In accordance with Design Guideline Drawings and Light Fixture Product Manual)		Contact Lightolier (Kathleen Kenny 813-760-3421) with dimming control load schedule and to obtain project specific specifications.					(Mercury picograms per lumen-hr=N/A)			Gen 4 A.I.R.	Public	General Lighing - Controls (Refer to Design Guideline Systems Criteria Drawing)
D28		Sconce	Insight Lighting	M-NDL 150/INT/volt/TW/WPVS/ EB (WT-527-IBB-1-TW-WPVS)	11.75"D x 5"H x 11.5"W	Textured White / Perforated Cutoff Visor	Tempered Prismatic Glass	wall	Metal Halide T-6 G12	1	Philips CDM150/T6/830 #232728 (Mercury picograms per lumen-hr=119.05)	120	150	Gen 4 A.I.R.	Public	Pool - Indoor
D104	X405	Vanity Wall Sconce	Pacific Coast Lighting	89-5180-99C	40.39"W x 6"L x 4"H	Brushed Nickel	Acylic	wall	Fluorescent F25T8	2	Philips F25T8/TL830/PLUS/ALTO #145565 (Mercury picograms per lumen-hr=27.64)	120	50	Gen 4 A.I.R.	Guestroom	ADA Toilet
D105	PG402	Sconce	Renaissance Lighting Inc.	RL-742-SHS	9.5"W x 18"L x 3"D	Powdercoat	Frosted Acrylic	wall	Compact Fluorescent 4-pin	1	(Mercury picograms per lumen-hr=TBD)	120	26	Gen 4 A.I.R.	Public	Corridor at Guestroom Entry
D107	X400	Wall Bracket Light - LED	Challenger Lighting Company, Inc.	HA3104-00BN	2"W x 10-"D x 2.25"H	Brushed Nickel		Headboard	LED	1	(Mercury picograms per lumen-hr=0)	120	3	Gen 4 A.I.R.	Guestroom	Bed Headboard
D108	X402	Sconce	Lightolier - A Philips Group	48023-ALU/4916	6.5"W x 47-7/16"D x 3-5/8"H	Metalic aluminum powder coat		Headboard	Fluorescent T5	1	Philips F28T5/830/ALTO #230847" (Mercury picograms per lumen-hr=25.00)	120	28	Gen 4 A.I.R.	Guestroom	Bed Headboard
D109	X410 PART	Wall Bracket Light: Plug-in	FurnLite, Inc.	FC-3610 (Supplied by casegood manufacturer, Data for information only)	1-1/4"W x 35-1/8"L x 9/16"D	White Aluminum		Installed in Desk and Dry-Bar	Fluorescent T5	1	(Mercury picograms per lumen-hr=TBD)	120	21	Gen 4 A.I.R.	Guestroom	Desk and Dry-bar, integral with casegood unit
D110	GR400	Ceiling Pendant	Trend Lighting - A Division of McFadden Lighting Co., Inc.	TP4374	23.5" Diam x 80" Max (Adjustable)	Santin Powdercoat Steel with 4.75" Woven Aluminum Shade Material		Ceiling	Halogen G4 Bi-Pin 12 Volt	12	(Mercury picograms per lumen-hr=TBD)	120	120	Gen 4 A.I.R.	Public	Greatroom in Center of Lounge Circle
D112	MR400	Pendant	Lightolier - A Philips Group	48228ALMX1/40810	8-1/4"W x 47-1/2" L x 6-13/16"H	Metallic Aluminum Powder Coat	Curved Glass Diffuser	ceiling	Fluorescent 54w T-5 HO, Mini-Bipin High Output	2	Philips F54T5/830/HO/ALTO #290262 (Mercury picograms per lumen-hr=11.79)	120	108	Gen 4 A.I.R.	Public	Meeting Room
D121		Cove - LED	Color Kinetics - Philips Solid-State Lighting Solutions	eWCovePowercore 253-000005-00	1.25" Diam x 1.37"H x 12" L Or 1.25" Diam x 1.37"H x 6" L (Use combination of 12" & 6" to achieve longest length)	Concealed 2800 Kelvin Cove light with 110 degree x 110 degree beam. Gray injection molded housing. Integral power driver. 67/135 Lumens per 6"/12". 50,000 hr life.		cove	LED LED 2800K, 3500K	3 (6") or 5 (12")	(Mercury picograms per lumen-hr=0)	120		Gen 4 A.I.R.	Public	Greatroom: Lounge Circle / Communal Circle / Front Desk Cloud / Elevator Lobbies

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Universal Mark	I.D. X-Ref	Product	Manufacturer	Model No.	Size	Fixture Description	Lens	Mount	Lamp Type	Qty.	Lamp Model No. / Mecury Content	Volts	Fixture Watts (Max)	Gen / Decor Scheme	Area	Location
D121		Cove - LED	Color Kinetics - Philips Solid-State Lighting Solutions	eWCovePowercore 253-000005-00	1.25" Diam x 1.37"H x 12" L Or 1.25" Diam x 1.37"H x 6" L (Use combination of 12" & 6" to achieve longest length)	Concealed 2800 Kelvin Cove light with 110 degree x 110 degree beam. Gray injection molded housing. Integral power driver. 67/135 Lumens per 6"/12". 50,000 hr life.		cove	LED LED 2800K, 3500K	3 (6") or 5 (12")	(Mercury picograms per lumen-hr=0)	120		Gen 4 A.I.R.	Public	Inside Communal Table / behind Registration Desk Panels
D121 (ALT1)		Cove - LED	RSL - Roberts Step-Light Systems	RW12-LED-2850-FL	.46"W x .75"H	Concealed lighiting channel with lamps 1" o.c. 23 Lumens per LED. Remote DC driver. Not on dimmer. 50,000 hr life		cove	LED LED 2850 K		(Mercury picograms per lumen-hr=0)	120		Gen 4 A.I.R.	Public	Greatroom: Lounge Circle / Communal Circle / Front Desk Cloud / Elevator Lobbies
D121 (ALT1)		Cove - LED	RSL - Roberts Step-Light Systems	RW12-LED-2850-FL	.46"W x .75"H	Concealed lighiting channel with lamps 1" o.c. 23 Lumens per LED. Remote DC driver. Not on dimmer. 50,000 hr life		cove	LED LED 2850 K		(Mercury picograms per lumen-hr=0)	120		Gen 4 A.I.R.	Public	Inside Communal Table / behind Registration Desk Panels
D121 (ALT2)		Cove	Celestial Lighting	UBL 5000BXOX	3-1/4"W x 2"H (4-1/2" H w/lamps)	Concealed curvable lighiting channel with overlapping lamps Not on dimmer		cove	Fluorescent F40/30BX/SPX 30 (GE16953)		Phillips PL-L 40W/30/RS 25PK #300426 (Mercury picograms per lumen-hr=23.57)	120	40	Gen 4 A.I.R.	Public	Greatroom: Lounge Circle / Communal Circle / Front Desk Cloud / Elevator Lobbies
D126		Decorative	Visual Lighting Technologies	1) LGS150-4-28-D1/S-D-120/60 (1) AC-HA/R/RBL-RCP-RND (1) SVC-HT-28-RCP-RND (180') F-MF-EL-PM-4.5 (12) SVC-FT-ID-4.5 (12) DL-ID-FX-50-26-WH (1) AC-DMX-CNT-MNT-ROB-D-120/60 (1) AC-DMX-CBL-50 (1) AC-DMX-CBL-TRM	1.949" Diam x 0.984"H Downlight with 16.16"L x 6.32"H x 9.22"W illuminator.	Wet-location Fiberoptic downlight with DMX Controlled 6-Color wheel and remoted mounted metal halide illuminator box. Illuminator for dry/damp location only.		Ceiling & Remote	Fiberoptic		(Mercury picograms per lumen-hr=TBD)	120		Gen 4 A.I.R.	Public	Swimming Pool at Water Feature
D127	X502	Backlit Mirror	Electric Mirror, LLC	Trinity 30	30" diameter x 2.65" D	Round Backlit Mirror with one line of continuous light framing the mirror behind frosted glass		wall			(Mercury picograms per lumen-hr=TBD)	120		Gen 4 A.I.R.	Guestroom	Bath
D128	ED400	Vanity Wall Sconce	Renaissance Lighting Inc.	RL-726	4"W x 18"L x 3"H	Satin Chrome with brushed finish		wall	Fluorescent G-24 Q3 / 4-pin Quad	2	Philips PL-C 26W/830/4P/ALTO #383356 (Mercury picograms per lumen-hr=75.27)	120		Gen 4 A.I.R.	Back of House	Employee Toilet
D128	PR401	Vanity Wall Sconce	Renaissance Lighting Inc.	RL-726	4"W x 18"L x 3"H	Satin Chrome with brushed finish		wall	Fluorescent G-24 Q3 / 4-pin Quad	2	Philips PL-C 26W/830/4P/ALTO #383356 (Mercury picograms per lumen-hr=75.27)	120		Gen 4 A.I.R.	Public	Restrooms
F05		Box	Lightolier - A Philips Group	DPA 2G 9LP 3FT - 120 - X3	2'W x 2'L	White (Accommodates Standard Grid Ceiling)	parabolic	recessed	Fluorescent 40W T5	3	Philips PL-L 40W/830/4P/RS/IS #300426 (Mercury picograms per lumen-hr=23.57)	120	117	Gen 4 A.I.R.	Back of House	Employee Dining / Employee Toilet / Workroom / Office

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Universal Mark	I.D. X-Ref	Product	Manufacturer	Model No.	Size	Fixture Description	Lens	Mount	Lamp Type	Qty.	Lamp Model No. / Mecury Content	Volts	Fixture Watts (Max)	Gen / Decor Scheme	Area	Location
F07		Strip	Lightolier - A Philips Group	JS4 C232 120 - SO	5.75"W x 4'L	wrap around lensed fluorescent	acrylic	surface	Fluorescent F032T8	2	Philips F32T8/TL830/ALTO #246678 (Mercury picograms per lumen-hr=25.30)	120	70	Gen 4 A.I.R.	Back of House	Mechanical / Electrical / CATV / Market Storage / Linen Storage / Pool Equip. / Pool Storage / Engineering Office
F09		Lensed Box	Lightolier - A Philips Group	SPS 2G FSVA 432-120-04	2'W x 4'L	white	acrylic	recessed	Fluorescent F032T8	4	Philips F32T8/TL830/ALTO #246678 (Mercury picograms per lumen-hr=25.30)	120	128	Gen 4 A.I.R.	Back of House	Employee Restroom / Food Prep / Laundry / Linen Storage
F27		Concealed Strip	Lightolier - A Philips Group	SV4-154-120-PG	1-3/8"W x 2"H (2-3/8" H w/lamps)	Concealed Strip		recessed	Fluorescent F54T5/835/HO		Philips F54T5/830/HO/ALTO #290262 (Mercury picograms per lumen-hr=11.79)	120	54	Gen 4 A.I.R.	Public	Built-In to top of Market Millwork
F30		Box	Lightolier - A Philips Group	H9S2GLR228UNVVY XN8 / UL2F-WS3	2'W x 4'L	Recessed Fluorescent with switched dimming ballast and occupancy sensor. Dim from 100% to 50% when unoccupied. Occupancy sensors to be interconnected within same room.	DR Acrylic	Ceiling (Suitable for Grid and slot ceiling types)	Fluorescent F28T5	2	Philips F28T5/830/ALTO #230847 (Mercury picograms per lumen-hr=20)	120 / 277	65	Gen 4 A.I.R.	Public	Exercise Room
F31		Sconce	Lightolier - A Philips Group	F3484-36U	49"W x 5-1/8"H	2-Lt Fluorescent, Satin Nickel, Etched White	Etched White	Wall	Fluorescent F32T8	2	Philips F32T8/TL830/ALTO #246678 (Mercury picograms per lumen-hr=25.30)	120	64	Gen 4 A.I.R.	Public	Exit Stairs
O01		Jelly Jar	Exceline - A Philips Group	RLW26HFLCGC-1	8.6"W x 10.38"H	White powder coated aluminum with cage. Heat and shock resistant optical chamber	glass	wall	Compact Fluorescent PL-T 26/4PIN	1	(Mercury picograms per lumen-hr=)	Philips PL-T 26W/830/4P/ ALTO #268235	2.7	Gen 4 A.I.R.	Back of House	Elevator Pit
O03		Pool Light	Provided by Pool Manufacturer			underwater pool light		wall	Incandescent		(Mercury picograms per lumen-hr=TBD)	120		Gen 4 A.I.R.	Public	Pool (underwater)
R01		Down	Lightolier - A Philips Group	1001F13U / 1001CL	5" diameter	Specular Clear Alzak		recessed	Compact Fluorescent 13w quad 4 pin	1	Philips PL-C 13W/830/4P/ALTO #383265 (Mercury picograms per lumen-hr=150.54)	120/277	16	Gen 4 A.I.R.	Guestroom	Bath / Queen-Queen Closet
R05		Down	Lightolier - A Philips Group	C770MHU / C7E17PLWHW	7" diameter	Specular Clear Alzak		recessed	Metal Halide 70 Watt, ED17, BD1 (for Enclosed applications) ANSI CODE M98/M143	1	Philips MHC70/U/M/3K/ALTO # 208843 (Mercury picograms per lumen-hr=76.34)	120	70	Gen 4 A.I.R.	Exterior	Porte Cochere - Option 1
R09		Down	Lightolier - A Philips Group	1002 P1 / 1013	5" diameter	Specular Clear Alzak		recessed	Incandescent 75 PAR 30 Flood	1	Philips 75PAR38/HAL/FL #144865 (Mercury picograms per lumen-hr=0)	120	75	Gen 4 A.I.R.	Exterior	Canopy

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R31		Down	Lightolier - A Philips Group	8021CCD-S6132BU	6" aperture	Comfort clear diffuser w/universal electronic ballast. Not on dimmer.		recessed	Compact Fluorescent 32w TTTT / 830	1	Philips PL-T 32W/830/4P/ALTO #268326 (Mercury picograms per lumen-hr=82.72)	120	36	Gen 4 A.I.R.	Public	Great Room General / Corridors / Public Restrooms / Entry Vestibules
R32		Down	Lightolier - A Philips Group	8021CCD-S6132CU	6" aperture	Comfort clear diffuser w/universal electronic ballast. On dimmer.		recessed	Compact Fluorescent 32w TTTT / 830	1	Philips PL-T 32W/830/4P/ALTO #268326 (Mercury picograms per lumen-hr=82.72)	120	36	Gen 4 A.I.R.	Public	Greatroom: Lounge Circle / Meeting Room
R32D		Dimmer	Lightolier - A Philips Group	OS600HDF120WH Dimmer	2.74"W x 4.68"H	Dimmer Slide Switch in location shown to control set of R32 fixtures.					(Mercury picograms per lumen-hr=N/A)	120		Gen 4 A.I.R.	Public	Meeting Room
R33		Down	Lightolier - A Philips Group	C3LV-C3MRD CCDW	3" aperture	Comfort clear diffuse downlight with integral magnetic transformer. Not adjustable head. On dimmer.		recessed	Low Voltage Incandescent 35MRC16	1	Philips 35MRC16/IRC/SP8 #202630 (Mercury picograms per lumen-hr=0)	120	42	Gen 4 A.I.R.	Public	Buffet, Network Zone, Registration
R34		Down	Lightolier - A Philips Group	C3LV-C3MRA CCDW	3" aperture	Comfort clear diffuse adjustable accent with integral magnetic transformer. On dimmer.		recessed	Low Voltage Incandescent 50MRC16	1	Philips 50MRC16/NFL24 EXZ #378174 (Mercury picograms per lumen-hr=0)	120	50	Gen 4 A.I.R.	Public	Greatroom / Corridor / Business Library
R35		Down	Lightolier - A Philips Group	PS4M165EBL	17L" X 4 9/16" W aperture	Recessed adjustable linear downlight with black aperture and white ceiling flange. Not on dimmer		recessed	Low Voltage Incandescent 50W MR16	4	Philips 50MRC16/NFL24 EXZ #378174 (Mercury picograms per lumen-hr=0)	120	200	Gen 4 A.I.R.	Public	The Market
R36		Wall wash	Peerless - Acuity Brands Lighting, Inc.	LWR9G154T5HO	3 1/2W" x 48L" aperture	Recessed asymmetric slot wallwash with black metal diffuser with round holes		recessed	Fluorescent F54T5/835/HO	1	Philips F54T5/830/HO/ALTO #290262 (Mercury picograms per lumen-hr=11.79)	120	54	Gen 4 A.I.R.	Public	Registration Accent Wall
R37		Down	Lightolier - A Philips Group	377CHX / 302MRX	4-1/2" aperture	Wet Listed flat lens Downlight	Frosted Glass	recessed	Halogen 35W MR-16	1	Philips 35MR16/FL36 #140566 (Mercury picograms per lumen-hr=0)	120	35	Gen 4 A.I.R.	Guestroom	Bath Shower Light Pocket
R38		Decorative	Custom Light Fixture								(Mercury picograms per lumen-hr=TBD)			Gen 4 A.I.R.	Exterior	Porte Cochere Option 2 or 3
T03		Exhast Fan/Light	Panasonic	FV-08VQL4	9-1/8" sq. mounting opening / 12-1/2" sq. Grille / 4" Diam Duct / 70 CFM	White	Acrylic	ceiling	Compact Fluorescent 26 watt	1	Philips PL-C 18W/830/4P/ALTO #383307 (Mercury picograms per lumen-hr=108.53)	120	26	Gen 4 A.I.R.	Guestroom	Bath / Toilet
T03 (ALT)		Exhast Fan/Light	Broan-NuTone LLC	QTXE080FLT	10-1/2" x 11-3/8" mounting opening / 13-3/8 x 14-1/2 Cover / 6" Diam Duct / 80 CFM	White	Polymeric	ceiling	Compact Fluorescent 42 watt	1	Philips PL-T 42W/830/4P/ALTO #268730 (Mercury picograms per lumen-hr=62.04)	120	42	Gen 4 A.I.R.	Guestroom	Bath / Toilet
T04		Dome	Pacific Coast Lighting	84-9284-99C	10.5 Diameter x 2.5 depth	Stainless rim with glass cover	glass	ceiling	incandescent 22 watt	1	(Mercury picograms per lumen-hr=TBD)	120	22	Gen 4 A.I.R.	Guestroom	Bath (To be used w/continuous ventilation only)

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Light Fixture Matrix

SpringHill Suites

Gen 4 - New Build - A.I.R.

Universal Mark	I.D. X-Ref	Product	Manufacturer	Model No.	Size	Fixture Description	Lens	Mount	Lamp Type	Qty.	Lamp Model No. / Mecury Content	Volts	Fixture Watts (Max)	Gen / Decor Scheme	Area	Location
X01		Exit	Lightolier - A Philips Group	LDSNU (R or G) - W (with Battery) or LDSAU (R or G) - W (with out Battery)	n/a	Universal arrows / Single-Sided (R=Red Letter Color / G=Green Letter Color)		universal	LED LED comes w/ fixture		(Mercury picograms per lumen-hr=0)	120	2	Gen 4 A.I.R.	Public	Exit
X02		Exit	Lightolier - A Philips Group	LDSNU (R or G) - W (with Battery) or LDSAU (R or G) - W (with out Battery)	n/a	2-Sided (R=Red Letter Color / G=Green Letter Color)		universal	LED LED comes w/ fixture		(Mercury picograms per lumen-hr=0)	120	2	Gen 4 A.I.R.	Public	Exit
X03		Emergency	Lightolier - A Philips Group	E3 1 18L 2 S9 W	n/a	emergency battery - White		wall	Low Voltage 9 watt	2	6V, 9 watt (Mercury picograms per lumen-hr=0)	120	18	Gen 4 A.I.R.	Public	Egress Corridors
Z20	RO-400 / OD-400	Ground Light	Global Lighting	Kanpazar	58.25"H x 17.5"W	White polyethelyne with black iron base	Tempured Inverse Conical Glass lens w/collimating	Ground	Fluorescent	2	(Mercury picograms per lumen-hr=TBD)	120	110	Gen 4 A.I.R.	Exterior	Outdoor Patio
Z21		Sconce	Luminis	TP201-M100-BZ	10"H X 14"D	Dark Bronze		wall	Metal Halide 100w MH	1	(Mercury picograms per lumen-hr=TBD)	120	100	Gen 4 A.I.R.	Exterior	Porte Cochere
Z28		Emergency	Lightolier - A Philips Group	1101F2642UEM / 1101C	6-3/4" x 7-3/4"	Exterior	Spun Aluminum	Recessed	Incandescent PL-T32/4Pin	1	Philips PL-T 32W/830/4P/ALTO #268326 (Mercury picograms per lumen-hr=82.72)	120	32	Gen 4 A.I.R.	Exterior	Side Entrances
Z31		Site light for top of pole	Widelite- A Philips Lighting Company	OPP-400-S-(VOLT)-SS-TSA	36" x 13"	Dust Tite, Vertical Lamp Full Cutoff site fixture	Tempured Inverse conical glass lens w/collimating optic lens	Post Mtd	Pulse Start MH PS Metal Halide, 400 Watt BT28	1	Philips CDM400/V/O/PS/4K/ED 28/ALTO #145986 (Mercury picograms per lumen-hr=20.49)	TBD	400	Gen 4 A.I.R.	Exterior	Parking
Z32		Site light for top of pole	Lytepoles	101 - 5011 - 30 - AL	30' Pole	Pole, Textured Satin Aluminum Finish		Conc. Pad	N/A		(Mercury picograms per lumen-hr=N/A)			Gen 4 A.I.R.	Exterior	Parking

NOTE 1: Items with an ID X-Ref # are items purchased through Marriott's Procurement Division as FF&E items (Furniture, Fixture, Equipment) if this service is selected by Owner. Confirm with Owner whether to include these "decorative" but hardwired lighting fixtures in the scope of the General Contractor, or whether to remove if they are provided by Marriott Procurement Services.
NOTE 2: If Shown, items with "LVP" after Universal Mark Number are to be used for Marriott CFRST LEED Volume Program Projects in lieu of same Universal Mark Number without the "LVP".

SECTION 26 56 00 - EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Exterior Lighting Units with Luminaires
2. Ballasts
3. Lamps
4. Luminaire Support Components
5. Accessories

B. Related Sections:

1. Section 00 21 00 – Allowances
2. Section 00 41 13 – Bid Form
3. Section 00 43 10 – Break Out Pricing
4. Section 03 30 00 (03300) - Cast-in-Place Concrete.
5. Section 26 05 26 (16060) - Grounding and Bonding for Electrical Systems.
6. Section 26 51 00 (16510) - Interior Lighting
7. Section 26 60 00 (16580) - Lighting Accessories: For programmable lighting control systems, time switches, additional photoelectric relays, power relays, and contactors.

1.02 DEFINITIONS

A. Lighting Unit: A luminaire or an assembly of luminaires complete with a common support, including pole, post, or other structure, and mounting and support accessories.

B. Luminaire (Light Fixture): A complete lighting device consisting of lamp(s) and ballast(s), when applicable, together with parts designed to distribute light, to position and protect lamps, and to connect lamps to power supply.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in Project with the following supporting data:

1. For each type of lighting unit indicated, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
   a. Materials and dimensions of luminaires and poles.
   b. Certified results of laboratory tests for fixtures and lamps for photometric performance.
   c. High-intensity-discharge luminaire ballasts.
   d. Photometric data.
2. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.
3. Maintenance Data: For lighting units to include in maintenance manuals specified in Division 01.

1.04 QUALITY ASSURANCE

A. Luminaires and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use, location, and installation conditions by a testing agency acceptable to authorities having jurisdiction

B. Comply with ANSI C2.

C. Comply with NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING OF POLES

A. Package aluminum poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent surface more than 1/4 inch deep. Do not apply tools to section of poles below ground-line.

D. Retain factory-applied pole wrappings on fiberglass poles until just before pole installation. Handle poles with web fabric straps.

E. Retain factory-applied pole wrappings on metal poles until just before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.06 EXTRA MATERIALS

A. Furnish extra materials described in section 01 78 43 (01790) “Spare Parts and Materials” that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Refer to Section 26 51 00 for list of approved manufacturers.

2. Approved Manufacturers:

3. Subject to compliance with requirements, provide the products indicated for each designation in the Light Fixture Matrix attached at the end of this Section.

4. Refer to Section 26 51 00 for list of approved manufacturers.

2.02 LUMINAIRES

A. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

B. Metal Parts: Free from burrs, sharp corners, and edges.

C. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.

D. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

E. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange to disconnect ballast when door opens.

F. Exposed Hardware Material: Stainless steel.

G. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.

H. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.

2. Specular Surfaces: 83 percent.

3. Diffusing Specular Surfaces: 75 percent.

I. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor in luminaire doors.

J. Photoelectric Relays: As follows:

1. Contact Relays: Single throw, arranged to fail in the on position and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay.

2. Relay Mounting: In luminaire housing.

K. High-Intensity-Discharge Ballasts: Comply with ANSI C82.4. Constant wattage autotransformer or regulating high-power-factor type, unless otherwise indicated.

1. Ballast Fuses: One in each ungrounded supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

2. Single-Lamp Ballasts: Minimum starting temperature of minus 40 deg C.

3. Open-circuit operation will not reduce average life.

4. Noise: Uniformly quiet operation, with a noise rating of B or better.

L. Lamps: Comply with the standard of the ANSI C78 series that is applicable to each type of lamp. Provide luminaires with indicated lamps of designated type, characteristics, and wattage. Where a lamp is not indicated for a luminaire, provide medium wattage lamp recommended by manufacturer for luminaire.

1. Metal-Halide Color Temperature and Minimum Color-Rendering Index: 3600 K and 70 CRI, unless otherwise indicated.

2.03 LUMINAIRE SUPPORT COMPONENTS

A. Description: Comply with AASHTO LTS-3 for pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.

B. Wind-Load Strength of Total Support Assembly: Adequate to carry support assembly plus luminaires at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of 100 mph (160 km/h) with a gust factor of 1.3. Support assembly includes pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.

1. Strength Analysis: For each pole type and luminaire combination, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

C. Finish: Match finish of pole/support structure for arm, bracket, and tenon mount materials.

D. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Will not cause galvanic action at contact points.

2. Mountings: Correctly position luminaire to provide indicated light distribution.

3. Anchor Bolts, Nuts, and Washers: Hot-dip galvanized after fabrication unless stainless-steel items are indicated.

4. Anchor-Bolt Template: Plywood or steel.

E. Pole/Support Structure Bases: Anchor type with hold-down or anchor bolts, leveling nuts, and bolt covers.

F. Steel Poles: Tubing complying with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig (317 MPa); one-piece construction up to 40 feet in length with access handhole in pole wall.

1. Grounding Provisions for Metal Pole/Support Structure: Welded 1/2-inch threaded lug, accessible through handhole and listed for copper conductor connection.

2. Shafts: Square, straight.

G. Metal Pole Brackets: Match pole metal. Provide cantilever brackets without underbrace, in sizes and styles indicated, with straight tubular end section to accommodate luminaire.

H. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

I. Concrete for Pole Foundations: Comply with Section 03 30 00 (03300) "Cast-in-Place Concrete."

1. Design Strength: 3000-psig, 28-day compressive strength.

2.04 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Steel: Grind welds and polish surfaces to a smooth, even finish.

1. Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123.

2. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."

3. Interior: Apply one coat of bituminous paint on interior of pole, or otherwise treat to prevent corrosion.

4. Polyurethane Enamel: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

a. Color: Refer to Light Fixture Matrix.

PART 3 EXECUTION

3.01 INSTALLATION

A. Concrete Foundations: Construct according to Section 03 30 00 (03300) "Cast-in-Place Concrete."

1. Comply with details for reinforcement and for anchor bolts, nuts, and washers. Verify anchor-bolt templates by comparing with actual pole bases furnished.

2. Finish for Parts Exposed to View: Trowel and rub smooth. Comply with Section 03 30 00 (03300) - "Cast-in-Place Concrete" for exposed finish.

B. Embedded Poles: Set poles to indicated depth, but not less than one-sixth of pole length below finish grade. Dig holes large enough to permit use of tampers the full depth of hole. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.

C. Install poles as follows:

1. Use web fabric slings (not chain or cable) to raise and set poles.
2. Mount pole to foundation with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
3. Secure poles level, plumb, and square.
4. Grout void between pole base and foundation. Use non-shrinking or expanding concrete grout firmly packed in entire void space.
5. Use a short piece of 1/2-inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

D. Luminaire Attachment: Fasten to indicated structural supports.

E. Luminaire Attachment with Adjustable Features or Aiming: Attach luminaires and supports to allow aiming for indicated light distribution.

F. Lamp luminaires with indicated lamps according to manufacturer's written instructions. Replace malfunctioning lamps.

3.02 CONNECTIONS

A. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Ground metal poles/support structures according to Section 26 05 26 (16060) - "Grounding and Bonding for Electrical Systems."

1. Nonmetallic Poles: Ground metallic components of lighting units and foundations. Connect luminaires to grounding system with No. 6 AWG conductor.

3.03 FIELD QUALITY CONTROL

A. Inspect each installed unit for damage. Replace damaged units.

B. Advance Notice: Give dates and times for field tests.

C. Provide instruments to make and record test results.

D. Tests and Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source, and as follows:

1. Measure light intensities at night if specific illumination performance is indicated. Use photometers with calibration referenced to NIST standards.
2. Check intensity and uniformity of illumination.
3. Check excessively noisy ballasts.

E. Prepare a written report of tests, inspections, observations and verifications indicating and interpreting results.

F. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

3.04 CLEANING AND ADJUSTING

A. Clean units after installation. Use methods and materials recommended by manufacturer.

B. Adjust amiable luminaires and luminaires with adjustable lamp position to provide required light distributions and intensities.

END OF SECTION

REFER TO 26 51 00 FOR LIGHT FIXTURE MATRIX

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SECTION 26 60 00 (16580) - LIGHTING ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Time Switches
2. Photoelectric Relays
3. Occupancy Sensors
4. Multi-pole Lighting Relays and Contactors.
5. Hearing Impaired Door Annunciator

B. Related Sections:

1. Section 26 05 00 - Common Work Results For Electrical.
2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
3. Section 26 05 33 - Raceways and Boxes For Electrical Systems.
4. Section 26 05 53 - Identification for Electrical Systems.
5. Section 26 24 00 - Switchboards and Panelboards
6. Section 26 27 26 - Wiring Devices: For wall-box dimmers and manual light switches.

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data:

a. Include dimensions and data on features, components, and ratings for lighting control devices.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use and installation conditions by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NFPA 70.

1.04 COORDINATION

A. Coordinate features of devices specified in this Section with systems and components specified in other Sections to form an integrated system of compatible components. Match components and interconnections for optimum performance of specified functions. Include coordination with the following:

1. Section 26 24 00 (16440) - "Switchboards and Panelboards."

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Contactors and Relays:

a. None

2. Time Switches:
    a. None
3. Photoelectric Relays:
    a. None
4. Occupancy Sensors:
    a. None
5. Hearing Impaired Door Annunciator:
    a. None

B. Approved Manufacturers:
1. Contactors and Relays:
    a. Challenger Electrical Equipment Corp. (412-920-2400)
    b. Cutler-Hammer Products; Eaton Corporation (800-498-2678)
    c. GE Lighting Controls (888-437-3765)
    d. Hubbell Lighting, Inc. (864-599-6000)
    e. Siemens Energy and Automation, Inc. (800-964-4114)
    f. Square D Co.; a Division of Groupe Schneider, Power Management Organization (888-778-2733)
2. Time Switches:
    a. Diversified Electronics, Inc. (800-874-0619)
    b. Intermatic, Inc. (815-675-7000)
    c. Leviton Manufacturing Co., Inc. (718-229-4040).
    d. Tork, Inc. (914-664-3542)
3. Photoelectric Relays:
    a. Allen-Bradley/Rockwell Automation (414-382-2000)
    b. Intermatic, Inc. (815-675-7000)
    c. Rhodes: M H Rhodes, Inc. (800-548-3647)
    d. Tork, Inc. (914-664-3542)
4. Occupancy Sensors:
    a. Arrow Hart Wiring Devices (800-628-8956)
    b. Bryant Electric (800-323-2792)
    c. Honeywell, Inc.; Home and Building Controls (800-328-5111)
    d. Hubbell Lighting, Inc. (864-599-6000)
    e. Leviton Manufacturing Co., Inc. (718-229-4040).
    f. Lutron Electronics Co., Inc. (800-523-9466)
    g. Philips Lighting Company (800.555.0050)
    h. Tork, Inc. (914-664-3542)
    i. Watt Stopper, Inc. (The) (800-879-8585)

5. Hearing Impaired Door Annunciator:

2.02 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

A. Line-Voltage Surge Protection: Include in all 120- and 277-V solid-state equipment. Comply with UL 1449 and with ANSI C62.41 for Category A locations.

2.03 HEARING IMPAIRED DOOR ANNUNCIATOR.

A. Guestroom Door Annunciator Kit: Visual signaling device with strobe, hall push button station, and transformer. Minimum high intensity 150 candela visual signal.

B. Approved Manufacturer:

1. Edwards Signaling & Security Systems

C. The kit shall consist of the following components:

1. Push Button: No. 20
2. Cover Plate: No. 147-10
3. Strobe in location shown on Drawings: No. 89STR (B)–AQ
4. Auxiliary Strobe in bathroom: No. 89STR (B)-AQ
5. Below strobes provide a small plaque in off-white plastic with black letters that reads "**DOOR BUTTON SIGNALER**" as well as Braille equivalent. Secure to wall with clear sanitary sealant.
   a. Plaque: By Section 10 40 00 (10400) (Interior Signage Package).
6. Transformer: No. 598

D. A disconnect switch from the door button power transformer shall be located on the wall in location shown on Drawings with an applied label on the cover plate reading **"DOOR SIGNAL OVERRIDE"**.

1. Plaque: By Section 10 40 00 (10400) (Interior Signage Package).

E. Mount the push button at 48" above the floor on the corridor side next to the lock strike of the door.

F. Mount the strobe on the wall in location shown on Drawings at 80" above the floor.

G. Mount the auxiliary strobe on the bathroom wall in location shown on Drawings at 80" above the floor.

H. Screw components to walls using plastic plugs.

2.04 HEARING IMPAIRED DOOR ANNUNCIATOR.

A. Guestroom Door Annunciator Kit: Audible/visual signaling device with horn/strobe, hall push button station, and transformer. Minimum 82 dB sound pressure at 10 feet and a high intensity 110 candela visual signal.

1. "Model 7005-G5 Hotel Room Annunciator Kit"; Edwards Signaling & Security Systems
   a. Kit consisting of the following components:
      1) Model 6536-G5 Horn Strobe
      2) Model 592 Transformer
      3) Model 620 Push Button
      4) (Do not use 147-10 Face Plate)
   b. Model 147-1 Face Plate (No text on plate).
2. Locations as shown on Drawings.

Plaque: By Section 10 40 00 (10400) (Interior Signage Package).

B. Doorbell Disable Switch:

1. Single Pole Toggle Switch: Refer to Section 26 27 26 (16140).
2. Cover Plate: Refer to Section 26 27 26 (16140).
3. Plaque: By Section 10 40 00 (10400) (Interior Signage Package).
4. Location as shown on Drawings.

2.05 TIME SWITCHES

A. Description: Solid-state programmable units with alphanumeric display complying with UL 917.

1. Astronomic dial.
2. Two contacts, rated 30 A at 277-V ac, unless otherwise indicated.
3. Two pilot-duty contacts, rated 2 A at 240-V ac, unless otherwise indicated.
4. Eight-day program uniquely programmable for each weekday and holidays.
5. Skip-day mode.

2.06 PHOTOELECTRIC RELAYS

A. Description: Solid state, with single-pole, double-throw dry contacts rated to operate connected relay or contactor coils or microprocessor input, and complying with UL 773A.

B. Light-Level Monitoring Range: 0 to 3500 fc with an adjustment for turn-on/turn-off levels.

C. Time Delay: Prevents false operation.

D. Outdoor Sealed Units: Weathertight housing, resistant to high temperatures and equipped with sun-glare shield and ice preventer.

2.07 MULTI-POLE CONTACTORS AND RELAYS

A. Description: Electrically operated and mechanically held, and complying with UL 508 and NEMA ICS 2.

1. Current Rating for Switching: UL listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballasts with 15 percent or less total harmonic distortion of normal load current).
2. Control Coil Voltage: Match control power source.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install equipment level and plumb and according to manufacturer's written instructions.

B. Mount lighting control devices according to manufacturer's written instructions and requirements in Section 26 05 00 - "Common Work Results for Electrical".

C. Mounting heights indicated are to bottom of unit for suspended devices and to center of unit for wall-mounting devices.

3.02 CONTROL WIRING INSTALLATION

A. Install wiring between sensing and control devices according to manufacturer's written instructions and as specified in Section 26 05 19 - "Low-Voltage Electrical Power Conductors and Cables" for low-voltage connections.

B. Wiring Method: Install all wiring in raceway as specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

C. Bundle, train, and support wiring in enclosures.

D. Ground equipment.

E. Connections: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.03 IDENTIFICATION

A. Identify components and power and control wiring according to Section 26 05 53 - "Identification for Electrical Systems."

3.04 FIELD QUALITY CONTROL

A. Schedule visual and mechanical inspections and electrical tests with at least seven days' advance notice.

B. Inspect control components for defects and physical damage, testing laboratory labeling, and nameplate compliance with the Contract Documents.

C. Check tightness of electrical connections with torque wrench calibrated within previous six months. Use manufacturer's recommended torque values.

D. Verify settings of photoelectric devices with photometer calibrated within previous six months.

E. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:

1. Continuity tests of circuits.

2. Operational Tests: Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.

a. Include testing of devices under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.

F. Correct deficiencies, make necessary adjustments, and retest. Verify that specified requirements are met.

G. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.

H. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.

3.05 CLEANING

A. Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by manufacturers, and repair damaged finishes.

3.06 ON-SITE ASSISTANCE

A. Occupancy Adjustments: Within one year of date of Substantial Completion, provide up to three Project site visits, when requested, to adjust light levels, make program changes, and adjust sensors and controls to suit actual conditions.

END OF SECTION

SECTION 27 05 00 - COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Supporting Devices for Communication Components.
2. Concrete Equipment Bases.
3. Cutting and Patching For Communication Construction.
4. Touchup Painting.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete.
2. Section 07 84 00 - Firestopping.
3. Section 09 90 00 - Painting.
4. Division 26 and 28 Sections

1.02 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project with the following supporting data:

1. Product Data: For electricity-metering equipment.
2. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.
3. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. All work to be in accordance with latest requirements of the N.E.C. and all other applicable codes and regulations of authorities having jurisdiction over the work.

1.04 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the communication installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing communication materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate communication service connections to components furnished by utility companies.

1. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

D. Coordinate location of access panels and doors for communication items that are concealed by finished surfaces. Access doors and panels are specified in Section 08 31 00 (08310) - "Access Doors."

E. Coordinate all work with Division 26.

F. All communication drawings are to be read in conjunction with the project specifications and all other related contract drawings.

G. The contractor shall examine the site and observe the conditions under which the work will be done or other circumstances which will affect the contemplated work. No allowance will be made subsequently in the connection for any error or negligence on the contractor's part.

H. The contractor shall verify exact location, size and extent of all existing utilities, obstructions and/or other conditions which may affect the proposed work under the project. The contractor shall take every precaution to prevent damage to existing work and shall repair any damage as a result of this work.

I. The contractor shall verify all door swings in the field and mount switches on knob side of doors or as approved by the engineer.

J. The contractor shall carefully examine all contract drawings/specifications and be responsible for the proper fittings of materials and equipment at each location as indicated without substantial alteration. The drawings are generally diagrammatic and because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Furnishing such fittings that are required to meet such conditions shall be furnished and installed at no cost.

PART 2 PRODUCTS

2.01 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch diameter slotted holes at a maximum of 2 inches o.c., in webs.

1. Channel Thickness: Selected to suit structural loading.

2. Fittings and Accessories: Products of the same manufacturer as channel supports.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

E. Pipe Sleeves: ASTM A53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

G. Expansion Anchors: Carbon-steel wedge or sleeve type.

H. Toggle Bolts: All-steel springhead type.

2.02 CONCRETE BASES

A. Concrete Forms and Reinforcement Materials: As specified in Section 03 30 00 - "Cast-in-Place Concrete."

2.03 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 EXECUTION

3.01 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

E. Coordinate work with other trades and install conduit and boxes to clear embedded ducts, openings, etc. and all structural features.

F. Unless otherwise noted, mounting heights, as shown, are from finished floor to top of panelboard and to centerline of other equipment. Coordinate all mounting heights with contract drawings, local code requirements, and all A.D.A. requirements.

1. Toggle (snap) switch: 4’-0”.
2. Enclosed circuit breaker: 5’-0”
3. Disconnect (safety) switch: 5’-0”.
4. Motor starter: 5’-0”.
5. Panelboard: 6’-6”.

3.02 COMMUNICATION SUPPORTING DEVICE APPLICATION

A. Damp Locations, [Pool Equipment Rooms], Storage Rooms and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.03 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support communication components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.

K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten communication items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. New Concrete: Concrete inserts with machine screws and bolts.
4. Existing Concrete: Expansion bolts.
5. Steel: Welded threaded studs or spring-tension clamps on steel.
    a. Field Welding: Comply with AWS D1.1.
6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
7. Light Steel: Sheet-metal screws.
8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.04 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Section 07 84 00 (07840) “Firestopping."

3.05 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 (03300) "Cast-in-Place Concrete."

3.06 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.07 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Supporting devices for communication components.
2. Concrete bases.
3. Cutting and patching for communication construction.
4. Touch up painting.

3.08 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Section 09 90 00 (09900) - "Painting."

3.09 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 27 08 01 - COMMISSIONING OF COMMUNICATIONS

PART 1 – GENERAL

1.01 Description

A. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.

B. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the contract documents the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing Contractors/Sub-Contractors.

2. Verify and document proper performance of equipment and systems.

3. Verify that O&M documentation left on site is complete.

4. Verify that the Owner's operating personnel are trained.

C. The commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractors/Sub-Contractors to provide a finished and fully functioning product.

1.02 Related Work

A. Drawings and general requirements of the Contract, including General Conditions and Requirements, Supplementary Conditions, Revisions and other Specification sections, apply to work in this section.

B. Refer to Specification Sections 019100, "Commissioning" for information regarding:

1. Responibilities.

2. Commissioning Documentation.

3. Systems to be commissioned.

PART 2 - PRODUCTS

2.01 Test Equipment

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Contractors/Sub-Contractors for the equipment being tested.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, shall be included in the Contractors/Sub-Contractors bid price.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance. All equipment shall be calibrated within the last year, and according to the manufacturer's recommended intervals, and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 – EXECUTION

3.01 Meetings

A. Attend meetings as requied by Sections 019100, "Commissioning".

3.02 Reporting

A. Provide installation, start-up, testing, and training reports as required by Sections 019100, "Commissioning".

3.03 Documentation, Non-Conformance and Approval of Tests

A. Documentation. Provide all documentation required by Sections 019100, "Commissioning".

B. Contractor shall respond to all Non-Conformance reports.

C. Cost of Retesting: The cost for the Contractors/Sub-Contractors to retest a construction and startup or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the CM.

D. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the PM.

END OF SECTION 27 08 01

SECTION 27 10 00 - STRUCTURED CABLING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Premises Wiring For Telephone Distribution, Including Installations For Service By Local Telephone Exchange Carrier.

B. Related Sections:

1. Section 26 05 26 (16060) - Grounding and Bonding for Electrical Systems.
2. Section 26 05 33 (16130) - Raceways and Boxes for Electrical Systems.
3. Section 26 05 53 (16075) – Identification for Electrical Systems.
4. Section 27 20 00 (16740) - Communication and Data Processing Equipment.

1.02 DEFINITIONS

A. Local Exchange Carrier: Telephone utility or other entity that provides an access line from a local exchange into the premises.

B. Exchange Access Line: Circuit carrying telephone service into the premises.

C. Distribution Circuit: Circuit from the network interface device to a distribution device, such as a terminal block or junction box.

D. Station Circuit: Circuit from a distribution device to a telecommunications outlet.

E. Telecommunications Outlet: Telephone jack for connecting equipment to communication circuits.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indicating specified items selected for use in Project.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with EIA/TIA 570.

C. Comply with NFPA 70.

1.05 COORDINATION

A. Coordinate premises wiring with requirements of local telephone exchange carrier.

B. Coordinate premises wiring with requirements of telephone equipment supplier.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Comply with EIA/TIA 570.

B. Telecommunications and Auxiliary Disconnect Outlets: Four-position modular, latching, plug-type, jack-in, flush-mounting wall plate, unless otherwise indicated.

C. Wall Plates: Designed for telephone service. Match those indicated for power receptacle outlets in same spaces for materials and finish. For wall telephone units, include provision for support of unit.

D. Distribution and Station Cable: Category 5e, Four-pair, No. 24 AWG, solid-copper, unshielded, twisted-pair construction in PVC sheath.

1. Comply with ANSI/ICEA S-80-576.

2. Plenum cable is listed for use in plenums.

E. Cabinets: Comply with Section 26 05 33 "Raceways and Boxes for Electrical Systems." Furnish cabinets with backboard.

F. Backboard: 3/4-inch fireproofed interior grade plywood. Where installed in wire closet, height and width shall cover entire wall up to 96 inches above floor, unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Telephone Service: Comply with local telephone exchange carrier's requirements for details of telephone service.

B. Install outlet boxes and telecommunications outlets.

C. Install cable without damaging conductors and jacket.

1. Do not bend cable to a smaller radius than minimum recommended by manufacturer.

D. Install premises wiring in raceways, where raceway is in an accessible location, otherwise premises wiring shall be plenum rated and installed per manufacturer’s instructions.

1. Install cables in walls unless walls are solid or filled with insulation. In solid walls, install in raceway and terminate raceway with a bushing in ceiling space above outlet.

2. Install cables without raceway where concealed in accessible ceiling space, unless otherwise indicated.

3. Use pulling methods that will not damage cable or raceway, including fish tape, cable, rope, and wire-cable grips. Do not exceed manufacturer's recommended pulling tensions.

4. Pull cables simultaneously where more than one is being installed in the same raceway or at the same location.

5. Conceal raceway, except in unfinished spaces and as indicated.

E. Install exposed cable parallel or perpendicular to surfaces or exposed structural members and follow surface contours where possible.

F. Secure cable to independent supports at intervals as required to prevent sagging between supports.

G. Separation of Wires: Comply with EIA/TIA-569 rules for separating unshielded copper communication and data-processing equipment cables from potential EMI sources, including electrical power lines and equipment.

H. Provide additional 15’ of slack cabling at each end for adjustments and terminations.

3.02 CONNECTIONS

A. Ground equipment.

1. Install ground terminal at local exchange carrier service location and connect according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

2. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 IDENTIFICATION

A. Identify components and circuits according to Section 26 05 53 - "Identification for Electrical Systems."

B. Identify telephone system backboards and cabinets with the legend "Telephone."

C. Identify terminals at terminal strips, telecommunications outlets, and pull-and-junction boxes with approved designations.

D. Provide labels at both ends of cablings for identification.

3.04 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. Test continuity of each circuit pair loop.

END OF SECTION

SECTION 27 20 00 - COMMUNICATION AND DATA-PROCESSING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wire, Cable, Connecting Devices, Installation, And Testing For Wiring Systems To Be Used As Signal Pathways For Voice And High-Speed Data Transmission.

a. Mounting Elements

b. Twisted-Pair Cables, Connectors, and Terminal Equipment

c. Fiber-Optic Cables, Connectors, and Terminal Equipment

B. Related Sections include the following:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

2. Section 26 05 33 - Raceways and Boxes for Electrical Systems.

3. Section 26 05 53 – Identification for Electrical Systems.

4. Section 26 05 36 - Cable Trays for Electrical Systems.

5. Section 27 10 00 – Structured Cabling.

1.02 DEFINITIONS

A. EMI: Electromagnetic interference.

B. IDC: Insulation displacement connector.

C. LAN: Local area network.

D. PVC: Polyvinyl chloride.

E. STP: Shielded twisted pair.

F. UTP: Unshielded twisted pair.

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for Project with the following supporting data:

1. Shop Drawings: Include dimensioned plan and elevation views of components. Show access and workspace requirements.

a. System labeling schedules, including electronic copy of labeling schedules, as specified in Part 3, in software and format selected by Owner.

2. Product Certificates: Signed by manufacturers of cables, connectors, and terminal equipment certifying that products furnished comply with requirements.

3. Qualification Data: For firms and persons specified in "Quality Assurance" Article. Provide evidence of applicable registration or certification.

4. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

5. Maintenance Data: For products to include in maintenance manuals specified in Division 01.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is a registered communication distribution designer certified by the Building Industry Consulting Service International.

B. Comply with NFPA 70.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.05 COORDINATION

A. Coordinate Work of this Section with Owner's telephone switch, telephone instrument, workstation, and LAN equipment suppliers. Coordinate service entrance arrangement with local exchange carrier.

1. Meet jointly with representatives of above organizations and Owner's representatives to exchange information and agree on details of equipment arrangements and installation interfaces.

2. Record agreements reached in meetings and distribute record to other participants.

3. Adjust arrangements and locations of distribution frames, patch panels, and cross connects in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Cable:

a. None.

2. Terminal and Connector Components, and Distribution Racks:

a. Leviton Mfg. Co., Inc. (800-323-8920)

B. Approved Manufacturers:

1. Cable:

a. Belden Wire & Cable Company (317-983-5200)

b. BIW Cable Systems, Inc. (508-520-1200)

c. Essex Group, Inc.; Telecommunications Products Division (214-461-4000)

d. General Cable (908-769-3200)

e. Lucent Technologies, Inc.; Network Systems (800-344-0223)

f. Mohawk/CDT (800-422-9661)

g. Panduit Corp. (888-506-5400)

2. Terminal and Connector Components, and Distribution Racks:

a. Hubbell, Inc. (203-882-4800)

b. Lucent Technologies, Inc.; Network Systems (800-344-0223)

c. Panduit Corporation (888-777-3300)

d. Thomas & Betts Corp. (800-888-0211)

2.02 SYSTEM REQUIREMENTS

A. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.

B. Expansion Capability: Unless otherwise indicated, provide spare fibers and conductor pairs in cables, positions in patch panels, cross connects, and terminal strips, and space in backbone cable trays and wireways to accommodate 50 percent future increase in active station pairs.

2.03 MOUNTING ELEMENTS

A. Cable Trays: Comply with Section 26 05 36 "Cable Trays for Electrical Systems."

B. Raceways and Boxes: Comply with Section 26 05 33 "Raceways and Boxes for Electrical Systems."

C. Backboards: 3/4-inch interior-grade, fire-resistive-treated plywood.

D. Distribution Racks: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.

1. Approximate Module Dimensions: 84 inches high by 22 inches wide.

2. Finish: Baked-polyester powder coat.

2.04 TWISTED-PAIR CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

A. Listed as complying with Categories 5e of EIA/TIA-568-A. Telephone branch cable shall be Category 5e. Data branch cable shall be Category 5e.

1. Insulation Color: Blue

B. Conductors: Solid copper.

C. UTP Cable: Comply with EIA/TIA-568-A. Four thermoplastic-insulated, individually twisted pairs of conductors; No. 24 AWG, color-coded; enclosed in PVC jacket.

1. Jacket Color:

a. Telephone: White

b. Cata Cable: Blue

D. STP Workstation Cable: Comply with EIA/TIA-568-B. Two thermoplastic-insulated, individually twisted pairs of conductors; No. 22 AWG, color-coded, overall aluminum and polyester shield and No. 22 AWG tinned-copper drain wire; enclosed in PVC jacket.

E. UTP Plenum Cable: Listed for use in air-handling spaces. Features are as specified above, except materials are modified as required for listing.

F. UTP Cable Connecting Hardware: Comply with EIA/TIA-568-A. IDC type, using modules designed for punch-down caps or tools.

1. IDC Terminal Block Modules: Integral with connector bodies, including plugs and jacks where indicated.

2. IDC Connecting Hardware: Consistent throughout Project.

G. STP Cable Connecting Hardware: Comply with EIA/TIA-568-A for connectors, plugs, and jack assemblies.

H. Cross-Connect Panel: Modular array of IDC terminal blocks arranged to terminate building cables and permit interconnection between cables.

1. Number of Terminals per Field: One for each conductor in assigned cables.

2. Mounting: Backboard or rack as indicated.

I. Patch Panel: Modular panels housing multiple, numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to satisfy specified expansion criteria.

2. Mounting Rack.

J. Jacks and Jack Assemblies for data circuit UTP Cable: Modular, color-coded, RJ-45 receptacle units with integral IDC-type terminals.

K. Jacks and Jack Assemblies for telephone circuit UTP Cable: Modular, color-coded, RJ-11/RJ-45 receptacle units with integral IDC-type terminals. Color coded: white/blue, white/orange, white/green, white/brown.

L. UTP Patch Cords: Four-pair cables in 48-inch lengths, terminated with RJ-11 plug at each end.

M. STP Patch Cords: Two-pair cables in 48-inch lengths, terminated with STP plug connectors at both ends. Match plug connectors with patch-panel connectors.

N. Workstation Outlets: Dual jack-connector assemblies mounted in single or multigang faceplate.

1. Faceplate: High-impact plastic; color as selected by Owner representative.

2. Mounting: Flush, unless otherwise indicated.

3. Legend: Factory label top jack, "Voice" and bottom jack, "Data"; by silk-screening or engraving.

2.05 FIBER-OPTIC CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

A. Cables: Factory fabricated, jacketed, low loss, glass type, fiber optic, multimode, graded index, operating at 850 and 1300 nm.

1. Backbone, Strands per Cable: 12, unless otherwise indicated.

2. Dimensions: 62.5-micrometer core diameter, 125-micrometer cladding diameter.

3. Maximum Attenuation: Minus 3.75 dB/km at 850 nm; minus 1.5 dB/km at 1300 nm.

4. Minimum Modal Bandwidth: 160 MHz/km at 850 nm; 500 MHz/km at 1300 nm.

5. Operating Temperature Range: Minus 20 to plus 70 deg C.

B. Plenum Cable: Listed for use in plenums.

C. Cable Connectors: Quick-connect, simplex- and duplex-type SC couplers with self-centering, axial alignment mechanisms. Insertion loss not more than 0.7 dB.

D. Patch Panel: Modular panels housing multiple-numbered duplex cable connectors.

1. Permanent Connection: Permanently connect one end of each connector module to installed cable fiber.

2. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to satisfy specified expansion criteria.

3. Mounting: Rack.

E. Patch Cords: Dual fiber cables in 36-inch lengths.

1. Terminations: Two duplex connectors arranged to mate with patch-panel connectors, one at each end of each fiber in cord.

2.06 IDENTIFICATION PRODUCTS

A. Comply with Section 26 05 53 - Identification for Electrical Systems" and the following:

1. Cable Labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine pathway elements intended for cable. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATION OF MEDIA

A. Backbone Cable for Data Service: Use UTP cable complying with Category 5e of EIA/TIA-568-A, fiber-optic cable for runs between equipment rooms and wiring closets and for runs between wiring closets if over 100 meters.

B. Backbone Cables for Voice Service: Use UTP cable complying with Category 5e of EIA/TIA-568-A for runs between equipment rooms and wiring closets and for runs between wiring closets.

C. Horizontal Cables for Data Service: Use UTP cable complying with Category 5e of EIA/TIA-568-A for runs between wiring closets and workstation outlets.

3.03 INSTALLATION

A. Wiring Method: Install wiring in raceway where raceway is in an accessible location and cable tray except within consoles, cabinets, desks counters and above accessible ceilings where plenum wiring method may be used. Conceal raceway and wiring except in unfinished spaces.

B. Install cable using techniques, practices, and methods that are consistent with Category 5e rating of components and that ensure Category 5e performance of completed and linked signal paths, end to end.

C. Install cable without damaging conductors, shield, or jacket.

D. Do not bend cable in handling or in installing to smaller radii than minimums recommended by manufacturer.

E. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

1. Pull cables simultaneously if more than one is being installed in the same raceway.

2. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.

3. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage media or raceway.

F. Secure and support cable at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

G. Wiring within Wiring Closets and Enclosures: Provide adequate length of conductors. Train conductors to terminal points with no excess. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

H. Separation of Wires: Comply with EIA/TIA-569 rules for separating unshielded copper communication and data-processing equipment cables from potential EMI sources, including electrical power lines and equipment.

I. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.

J. Use splice and tap connectors compatible with media types.

K. Install a pull wire in each and every empty conduit.

L. For each guest room that contains more than one telephone location, all telephones are to be served by one cable that is daisy-chained or looped from the first outlet to the second and third, etc. all guest rooms must be provided with a discrete cable for that room, no common wiring between guest rooms.

M. Each cable shall be terminated and labeled with the room number for the purpose of identification.

N. Each administrative telephone location is to be served by one discrete four pair cable.

O. Connections of all telephone jacks should follow the USOC wiring standard.

P. Provide 15' of slack cabling at each end for adjustments and final terminations.

Q. Provide labeling at both ends for ease of identification.

3.04 GROUNDING

A. Comply with Section 26 05 26 (16060) "Grounding and Bonding for Electrical Systems."

B. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

C. Bond shields and drain conductors to ground at only one point in each circuit.

D. Signal Ground Terminal: Locate in each equipment room and wiring closet. Isolate from power system and equipment grounding.

E. Signal Ground Bus: Mount on wall of main equipment room with standoff insulators.

F. Signal Ground Backbone Cable: Extend from signal ground bus to signal ground terminal in each wiring closet and equipment room.

3.05 INSTALLATION IN EQUIPMENT ROOMS AND WIRING CLOSETS

A. Line walls with plywood backboards, floor to ceiling.

B. Mount patch panels, terminal strips, and other connecting hardware on backboards, unless otherwise indicated.

C. Group connecting hardware for cables into separate logical fields.

D. Use patch panels to terminate cables entering the space, unless otherwise indicated.

3.06 IDENTIFICATION

A. Identify system components complying with applicable requirements in Section 26 05 53 (16075) "Identification for Electrical Systems" and the following Specifications.

B. System: Use a unique, three-syllable alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations for facility's architectural arrangement.

1. First syllable identifies and locates wiring closet or equipment room where cable originates.

2. Second syllable identifies and locates cross-connect or patch-panel field in which cable terminates.

3. Third syllable designates type of media (copper or fiber) and position occupied by cable pairs or fibers in the field.

C. Workstation: Label cables within outlet boxes.

D. Distribution Racks and Frames: Label each unit and field within that unit.

E. Within Connector Fields, in Wiring Closets and Equipment Rooms: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both communication and data-processing equipment, use a different color for jacks and plugs of each service.

F. Cables, General: Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

G. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.

H. Cable Schedule: Post in prominent location in each wiring closet and equipment room. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Provide electronic copy of final comprehensive schedules for Project, in software and format selected by Owner.

3.07 FIELD QUALITY CONTROL

A. Testing: On installation of cable and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

1. Copper Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2 bidirectional Category 5e tester. Test for faulty connectors, splices, and terminations. Test according to EIA/TIA-TSB 67, "Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems." Link performance for UTP cables must meet minimum criteria of EIA/TIA-568-A.

2. Fiber-Optic Cable Procedures: Perform each visual and mechanical inspection and electrical test, including optional procedures, stated in NETA ATS, Section 7.25. Certify compliance with test parameters and manufacturer's written recommendations. Test optical performance with optical power meter capable of generating light at all appropriate wavelengths.

B. Correct malfunctioning units at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

3.08 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

3.09 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems.

1. Conduct training as specified in Section 01 79 00 (01820) "Training".

2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

3. Train designated personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and extending wiring to establish new workstation outlets.

END OF SECTION

SECTION 27 41 16 - TELEVISION EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Master Antenna Television Systems Using An Internal Antenna System, and a Satellite Earth-Station System of the Receive-Only Type As the Signal Source.

B. Related Sections:

1. Section 03 30 00 (03300) - Cast-in-Place Concrete.
2. Section 05 12 00 (05120) - Structural Steel.
3. Section 07 53 23 (07530) - Ethylene-Propylene-Diene-Monomer (EPDM) Roofing.
4. Section 07 61 00 (07610) - Sheet Metal Roofing
5. Section 26 35 33 (16280) - Power Factor Correction Equipment

1.02 DEFINITIONS

A. CATV: Community antenna television.

B. MATV: Master antenna television.

C. NTSC: National television system committee.

D. RF: Radio frequency.

1.03 SUBMITTALS

A. Product Data: Include detailed manufacturer's specifications for each component specified. Include data on features, ratings, and performance.

B. Shop Drawings: For television equipment. Include plans, elevations, sections, details, and attachments to other Work.

1. Design Calculations: Calculate requirements and perform structural analysis for installed products including selection of seismic restraints, signed and sealed by the qualified professional engineer responsible for their preparation.
2. Include dimensioned plan and elevation views of components and enclosures, and details of control panels. Show access and workspace requirements.
3. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

C. Product Certificates: Signed by manufacturers of television equipment and components certifying that products furnished comply with requirements.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements of installed systems.

F. Maintenance Data: For television equipment and components to include in maintenance manuals specified in Section 01 78 23 “Operating and Maintenance Data”. In addition to requirements specified in Section 01 77 00 "Contract Closeout," include the following:

1. Detailed operating instructions covering operation under both normal and abnormal conditions.

2. Routine maintenance requirements for system components.

3. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

G. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the television equipment manufacturer, for both installation and maintenance of units required for this Project, to supervise installation of the system.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of seismic controls for electrical and electronic equipment that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: Testing agency that is a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies, to supervise on-site testing specified in Part 3.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of television equipment and are based on the specific system indicated.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Comply with NFPA 70.

G. Comply with 47 CFR 15, 17, and 76.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: System components are equipped and rated for the environments where installed.

1. Service Conditions for Outdoor Equipment: Rate equipment for continuous operation under the following environmental conditions, unless otherwise indicated:

a. Temperature: Minus 22 deg F to plus 122 deg F

b. Relative Humidity: 5 to 100 percent.

c. Weather: Enclosure housings to prevent entry of moisture due to melting ice build-up or driven rain or snow.

2. Service Conditions for Indoor Equipment: Rate equipment for continuous operation under the following environmental conditions, unless otherwise indicated:

a. Temperature: 32 deg F to 122 deg F

b. Relative Humidity: 0 to 95 percent.

1.06 COORDINATION

A. Coordinate layout and installation of television equipment and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and form work requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 07 53 23 “Ethylene-Propylene-Diene-Monomer (EPDM) Roofing”

D. Coordinate work with antenna system supplier and provide the following:

1. PVC conduit with pull rope:
    a. Satellite antenna to head end conduit.
    b. Building to building conduit.
    c. Local antenna to head end conduit.
2. Building attic access.
3. Suite electrical (TV) boxes.
4. Empty conduit

1.07 WARRANTY

A. Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1. Special Warranty for Television System and Components: Written warranty, signed by manufacturer and Installer agreeing to correct system deficiencies and replace components that fail in materials or workmanship within specified warranty period when installed and used according to manufacturer's written instructions. This warranty shall be in addition to, and not limiting, other rights Owner may have under other provisions of the Contract Documents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. MATV System Components:
    a. None

B. Approved Manufacturers:

1. MATV System Components:
    a. On Command Video (720-873-3200)
    b. Substitution as approved by Marriott.

2.02 TELEVISION SYSTEMS

A. Components: Modular plug-in, heavy-duty, industrial- or commercial-grade units.

B. Equipment: Silicon-based, solid-state, integrated circuit devices.

C. Power Supply Characteristics: Devices shall be within specified parameters for ac supply voltages within the range of 105 to 130 V.

D. Protect signal cables and connected components against transient-voltage surges by suppressors and absorbers designed specifically for the purpose.

E. RF and Video Impedance Matching: Signal-handling components, including connecting cable, shall have end-to-end impedance-matched signal paths. Match and balance devices used at connections where it is impossible to avoid impedance mismatch or mismatch of balanced circuits to unbalanced circuits.

2.03 MATV EQUIPMENT

A. Description: Signal-source components, signal-processing and amplifying equipment, distribution components, and interconnecting wiring. System shall receive signals from sources, amplify and process them, and distribute them to outlets for receiving sets. UHF channels indicated to be received are translated to VHF channels before distribution to outlets.

B. Identification of Signal Sources and Channels Distributed:

C. MATV System Functional Description: System shall receive signals from sources, amplify and process them, and distribute them to outlets for receiving sets. UHF channels indicated to be received are translated to VHF channels before distribution to outlets.

2.04 MATV ANTENNAS

A. Satellite Earth-Station Antennas: Variable-alignment, receive-only, prime-focus, paraboloidal type.

1. Materials: Corrosion resistance, suitable for marine and moderate industrial environments.

2. Mount Configuration and Finish: Integral type with epoxy-powder coating finish.

3. Operating Frequency: 3.7 to 12.2 GHz.

4. Survival Wind Velocity: 100 mph, minimum.

5. Feed Horn: Dual C and K(u) bands, dual-polarization type.

B. Steerable-Satellite Earth-Station Antenna: Programmable motorized variable alignment throughout entire satellite coverage range.

C. Low-Noise Block Converter, K(u) Band: Weatherproof, with integral protection from surge voltages and an input frequency range to suit signals specified to be received.

D. Antenna-Support Structures: Prefabricated, hot-dip galvanized steel units.

1. Strength of Structure and Attachments: Adequate to withstand 100-mph winds while supporting installed antennas.

2. Comply with TIA 222 and 47 CFR 17.

3. Comply with FAA AC 70/7460-1.

2.05 MATV COMPONENTS

A. Satellite Receivers for Use with Steerable-Satellite Earth-Station Antennas: Include the following features:

1. C and K(u) band ready.

2. Automatic, programmable antenna positioning control and receiver tuning for a minimum of 40 channels, with manual override/fine tuning.

3. Intermediate frequency bandwidth individually adjustable per channel in increments from 17 to 36 MHz.

4. Stereo audio reception.

5. Manual and automatic, programmable channel selection.

6. Programmable timer for unattended system operation.

7. Digital indication of antenna position, channel selection, and signal strength.
8. Baseband video and stereo audio signal outputs.
9. Suitable for 19-inch electronic equipment rack mounting.

B. Signal-Path Adaptation Components: Units consistent with specified levels of overall system performance. Include the following where necessary for indicated functional requirements whether shown in system diagrams or not:

1. Modulators.
2. Demodulators.
3. Processors.
4. Descramblers.
5. Decoders.
6. Converters.

C. Preamplifiers: Coaxial-down-lead-broadband or single-channel type, inherently protected against lightning and voltage surges and enclosed in weatherproof housings. Use antenna cable for power supply from external source.

D. Head-End Equipment: Include filters, processors, broadband and single-channel amplifiers combining networks, power supplies, and other equipment as required to provide specified performance. House units in standard 19-inch electronic equipment cabinet.

E. Signal Power Splitters and Isolation Taps: Metal-enclosed directional couplers with brass connector parts. Where installed in signal circuits used to supply cable-powered amplifiers, power throughput capacity shall exceed load by 25 percent minimum.

F. Signal Traps: Packaged filters tuned to interference frequencies encountered in Project.

G. Attenuators: Fixed to balance signal levels.

H. Terminating Resistors: Enclosed units rated 0.5 W and matched for coaxial impedance.

I. Outlets: Flush, female type with metallic parts of anodized brass, beryllium copper, or phosphor bronze.

1. Wall Plates: Match materials and finish of power outlets in the same space.
2. Attenuation: Less than 0.1 dB.
3. Voltage Standing Wave Ratio: Less than 1.15 to 1.

2.06 SIGNAL TRANSMISSION COMPONENTS

A. Cable: Coaxial cable elements have 75-ohms nominal impedance and are 100 percent factory-sweep tested to meet or exceed requirements of NFPA 70, Articles 725, 800, and 820. Cables run in environmental air spaces are listed for use in plenums.

1. Satellite Antenna Cable: (2) two RG-11/U; cellular-polyethylene dielectric, tinned-copper braid shield with 100 percent shielding factor, No. 18 AWG solid copper conductor; and PVC jacket. From Head-end to satellite dish.
2. MATV Indoor Trunk Cable: RG-11/U; cellular-polyethylene dielectric, tinned-copper braid shield with 100 percent shielding factor, No. 18 AWG solid copper conductor; and PVC jacket. From Head-end room to the roof top, as directed by system manufacturer.
3. MATV Public area Indoor Branch Cable: (1) one RG-6/U; cellular-polyethylene dielectric, bare-copper braid shield with 95 percent minimum shielding factor, No. 18 AWG solid

copper-clad-steel conductor; and PVC jacket run to designated TV Outlet in “Public Area”, and “Hearth Room”.

4. Guest Room MATV Indoor Branch Cable: (1) One RG-6/U; cellular-polyethylene dielectric, bare-copper braid shield with 95 percent minimum shielding factor, No. 18 AWG solid copper-clad-steel conductor; and PVC jacket, plenum rated, to Guest Room TV Outlet.

B. MATV Coaxial Cable Connectors: Type F, 75 ohms.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine pathway elements intended for cable. Check raceways, cables trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for antenna to verify actual locations of cable connections before antenna installation.

C. Examine walls, floors, roofs, equipment bases, and roof supports for suitable conditions where television equipment is to be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Outdoor Installation: Comply with ANSI C2, "National Electrical Safety Code."

B. Install surge suppressors where ac-power-operated devices are not protected against voltage transients by integral surge suppressors specified in UL 1449. Install surge suppressors at the devices' power-line terminals. Comply with Section (26 35 33) 16280 “Power Filters And Conditioners”.

C. Support and anchor antenna towers, masts, and mountings.

1. Concrete Foundations: Reinforced concrete complying with Section (03 30 00) 03300 "Cast-in-Place Concrete."

2. Steel Anchorage Components: Galvanized-steel shapes and plates complying with Section (05 12 00) 05120 "Structural Steel."

D. All entry conduits shall have a 200 lb. Pull rope provided with a 24” length extending at both ends of conduit terminations.

E. Complete trim-out of system to include fitting cutting, installation of directional couplers, antennas and wall plates. Tag cable routing.

F. Satellite dish location, must be approved by Architect prior to installation.

G. Wiring Method: Install cables in raceways, except in accessible indoor ceiling spaces and attics, in hollow gypsum board partitions, and as otherwise indicated. Conceal raceways and wiring except in unfinished spaces.

H. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

I. Pulling Cable: Do not exceed manufacturer's recommended pulling tensions. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

J. Exposed Cable: Install parallel to building lines, follow surface contours, and support the cable according to manufacturer's written instructions. Do not run adjacent and parallel to power or data cables.

K. Equalizing Video Signals: Where system performance may be degraded in certain operating modes, revise component connections and install video distribution amplifiers and attenuators as required to provide a balanced signal across the system.

L. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

M. Grounding: Provide independent signal circuit grounding recommended by manufacturer.

3.03 CABLING

A. Coaxial cables should have approximately 3 feet of slack in the ceiling fur-down areas and 6” to 1’ slack in the guest room wall junction boxes.

B. Cables shall be tested for continuity prior to and after sheet-rocking of the walls and ceiling areas.

C. Recommended conduit sizes and junction boxes will be provided by and installed by the subcontractor and must meet or exceed N.E.C. and Local City codes.

D. Cabling will be provided by On Command Video.

E. Cabling shall be ringed-out and labeled accordingly.

F. Cabling should not have a bend in routing of less than 90 degrees. It should also be free of cuts, scraps, splices and barreling techniques.

G. Guest corridor/trunk cabling, i.e. RG-11 Plenum, shall be anchored every 6 feet between J-boxes via zip ties or clamps.

H. Fireproof caulking material must be used when cutting any holes into sheet rocked walls when routing cables from the guest corridors into the first floor guest room wall junction boxes.

I. Cabling entering the MATV Equipment Room should have a minimum of 10 feet slack and all centrally located in that room on the west wall.

J. Cable installation methods must meet or exceed N.E.C. and Local City Codes.

3.04 MATV INSTALLATION

A. Head-End Equipment: Mount in electronic equipment the types of cabinets recommended by manufacturer. Group related items in methodical sequence.

B. Satellite Receivers: Mount in head-end equipment racks.

C. Arrange equipment to facilitate access for maintenance and to preserve headroom and passage space.

D. MATV Antennas: Align antenna elements to achieve maximum signal level and quality.

E. MATV Antenna-Supporting Structure: Increase antenna height as required to obtain signal strength needed for specified system performance.

1. Attachment to Building: Use 0.375-inch- minimum expansion anchors for masonry and place anchors clear of grout or mortar joints.

2. Attachment to Building: Use 0.375-inch- minimum lag bolts for attachment to wood.

3. Grounding: Comply with NFPA 780, "Installation of Lightning Protection Systems," unless more stringent requirements are indicated.

F. Antenna Cable Entrance: Use entrance fittings and seal and waterproof penetrations of the building envelope.

3.05 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Section 26 05 53 " Identification for Electrical Systems."

3.06 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation and supervise pre-testing, testing, and adjusting of television equipment.

B. Inspection: Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

C. Pre-testing: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Replace malfunctioning or damaged items. Retest until satisfactory performance and conditions are achieved. Prepare television equipment for acceptance and operational testing as follows:

1. Off-Air, Mast-Mounted Antenna Sources: Connect the receiver to the down lead of a 10-element, single-channel antenna, tuned and oriented to optimize reception for the channel and placed at the system antenna's location. Alternatively, connect the receiver to a single-channel video amplifier connected to the down lead of the above single-channel antenna.

2. CATV Sources: Connect the receiver to an agile demodulator or CATV set-top converter at the CATV service entrance to the facility.

3. Satellite Earth-Station System Sources: Adapt the receiver to the output of the satellite-TV receiver.

D. Test Schedule: Schedule tests after pre-testing has successfully been completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.

E. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

F. MATV System Acceptance Tests: Include the following, performed according to NCTA-02:

1. Instrumentation: Use a field-strength meter rated for minus 40-dB mV measuring sensitivity and a frequency range of 54 to 812 MHz, minimum. Provide documentation of recent calibration against recognized standards.

2. Signal Level: Use a field-strength meter to measure signal levels at MATV system outlets. Readings on each of the channels designated to be received must be within specified limits.

3. Signal-to-Noise-Ratio Test: Use a field-strength meter to make a sequence of measurements at the output of the last distribution amplifier or of another agreed-upon location in system. With system operating at normal levels, tune meter to the picture carrier frequency of each of the designated channels in turn and record the level. With signal removed and input to corresponding head-end amplifier terminated at 75 ohms, measure the level of noise at the same tuning settings. With meter correction factor added to last readings, differences from first set must not be less than 45 dB.

4. Picture-Quality Test: Connect a standard TV receiver to each system outlet and observe picture quality on designated channels. No evidence of cross-channel inter-modulation, ghost images, or beat interference should appear.

G. Qualitative and Quantitative Performance Tests: Demonstrate reception quality of color-television program transmissions at each system outlet from each designated channel and source. Quality shall be equal to or superior than that obtained with performance checks specified below, using a standard, commercial, cable-ready, color-television receiver. Level and quality of signal at each outlet and from each designated channel and source shall comply with the following Specifications when tested according to NCTA-02 or 47 CFR 76:

1. RF Video Carrier Level: Between 3 and 12 dB mV.
2. Relative Video Carrier Level: Within 3 dB to adjacent channel.
3. Carrier Level Stability, Short Term: Level does not change more than 0.5 dB during a 60-minute period.
4. Carrier Level Stability, Long Term: Level does not change more than 2 dB during a 24-hour period.
5. Broadband Frequency Response: More than the 54- to 220-MHz frequency range, signal amplitude is plus or minus 3 dB, maximum.
6. Channel Frequency Response: Across any 6-MHz channel in the 54- to 220-MHz frequency range, referenced to video carrier, signal amplitude is plus or minus 1 dB, maximum, unless otherwise indicated.
7. Carrier-to-Noise Ratio: 45 dB or more, unless otherwise indicated.
8. RF Visual Signal-to-Noise Ratio: 43 dB or more.
9. RF FM Carrier Level: 13 to 17 dB below video carrier level.
10. FM Frequency Response: More than the 88- to 108-MHz frequency range, signal amplitude is plus or minus 0.75 dB, maximum.
11. FM Carrier-to-Noise Ratio: More than 24 dB.

H. Record test results.

I. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.07 CLEANING

A. Clean installed items using methods and materials recommended by manufacturer.

B. Clean MATV system components, including antennas and supports, head-end equipment, distribution components, and outlets.

3.08 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain television equipment.

1. Conduct training as specified in Section 01 79 00 "Training".
2. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining equipment.
3. Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.
4. Demonstrate programming and tuning of satellite receivers.

3.09 ON-SITE ASSISTANCE

A. Occupancy Adjustments: When requested by Owner within one year of date of Substantial Completion, provide on-site assistance in tuning and adjusting the system to suit actual occupied conditions and to optimize performance. Provide up to two adjustments at Project site for this purpose, without additional cost.

END OF SECTION

SECTION 27 51 00 - DISTRIBUTED AUDIO-VIDEO COMMUNICATIONS SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Equipment for Amplifying, Distributing, and Reproducing Sound Signals.

B. Related Sections:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 33 - Raceways and Boxes for Electrical Systems.
3. Section 26 05 53 – Identification for Electrical Systems.
4. Section 27 20 00 - Communication and Data Processing Equipment.

1.02 DEFINITIONS

A. Channels: Separate parallel signal paths, from sources to loudspeakers or loudspeaker zones, with separate amplification and switching that permit selection between paths for speaker alternative program signals.

B. Zone: A separate group of loudspeakers and associated supply wiring that may be arranged for selective switching between different channels.

C. VU: Volume unit.

1.03 PERFORMANCE REQUIREMENTS

A. System Functions: Include the following:

1. Selectively connecting separate zones to different signal channels.
2. Selectively amplifying sound among various microphone outlets and other inputs.
3. Communicating simultaneously to all zones regardless of zone or channel switch settings.
4. Reproducing high-quality sound that is free from noise and distortion at all loudspeakers at all times during equipment operation, including standby mode with inputs off; and output free from non-uniform coverage of amplified sound.

1.04 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) indication items indicating specified items selected for use in Project with the following supporting data:

1. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection.
   a. Console layouts.
   b. Control panels.
   c. Rack arrangements.
2. Maintenance Data: For equipment to include in maintenance manuals specified in Section 01 83 00 “Operating and Maintenance Data”.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of equipment manufacturer for both installation and maintenance of equipment required for this Section.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

C. Comply with NFPA 70.

D. Comply with UL 50.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. Bose Speakers

B. Approved Manufacturers:

1. DMX, Inc. (800-345-5000)
2. Muzak (800-331-3340)

2.02 EQUIPMENT

A. Coordinate features to form an integrated system. Match components and interconnections for optimum performance of specified functions.

B. Equipment: Modular type, using solid-state components, fully rated for continuous duty, unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.

C. Waterproof Equipment: Listed and labeled for duty outdoors or in damp locations (pool).

D. Products: Provide the following products subject to conformance with the requirements specified.

1. AEI Propac cassette deck.
2. TOA P-912 MK2 amplifier and University 1701 MOH amplifier.
3. Volume Control, one for pool/spa room and one for meeting/breakfast room.
4. Bose #DS16F and DS16SE speakers and mounting hardware as required per layout.

2.03 PREAMPLIFIERS

A. Comply with EIA SE-101-A; either separately mounted or as an integral part of power amplifier.

B. Output Power: Plus 4 dB above 1 mW at matched power-amplifier load.

C. Total Harmonic Distortion: Less than 1 percent.

D. Frequency Response: Within plus or minus 2 dB from 20 to 20,000 Hz.

E. Input Jacks: Minimum of two. One matched for low-impedance microphone; the other matchable to cassette deck, CD player, or radio tuner signals without external adapters.

F. Minimum Noise Level: Minus 55 dB below rated output.

G. Controls: On/off, input levels, and master gain.

2.04 POWER AMPLIFIERS

A. Comply with EIA SE-101-A.

B. Mounting: As required to meet field conditions and as directed by Owner.

C. Output Power: 70-W balanced line.

D. Frequency Response: Within plus or minus 2 dB from 50 to 12,000 Hz.

E. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.

F. Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.

G. Output Regulation: Less than 2 dB from full to no load.

H. Controls: On/off, input levels, and low-cut filter.

I. Input Sensitivity: Matched to preamplifier and providing full-rated output with a sound-pressure level of less than 10 dynes/sq. cm impinging on a speaker microphone or handset transmitter.

2.05 COMPONENTS

A. Microphone: Comply with EIA SE-105.

1. Type: Dynamic, with cardioid polar or omni-directional characteristic.
2. Impedance: 150 ohms.
3. Frequency Response: Uniform, 60 to 12,000 Hz.
4. Output Level: Minus 58 dB minimum.
5. Finish: Satin chrome.
6. Mounting: Desk stand with integral-locking, press-to-talk switch.
7. Quantity of Microphones: Four, including one spare.
8. Quantity of Desk Stands: Three.

B. Telephone Paging Adapter: Arranged to accept voice signals from telephone extension dialing access and to automatically provide amplifier input and program override for pre-selected zones.

1. Minimum Frequency Response: Flat, 200 to 2500 Hz.
2. Impedance Matching: Adapter matches telephone line to public address equipment input.

C. Cone-Type Loudspeakers: Comply with EIA SE-103.

1. Minimum Axial Sensitivity: EIA pressure rating of 45 dB.
2. Frequency Response: Within plus or minus 3 dB from 50 to 15,000 Hz.
3. Size: 8 inches with 1-inch voice coil and minimum 5-oz. ceramic magnet.
4. Minimum Dispersion Angle: 100 degrees.
5. Rated Output Level: 10 W.
6. Matching Transformer: Comply with EIA-160. Full-power rated with four EIA standard taps. Maximum insertion loss of 0.5 dB.
7. Surface-Mounting Units: Ceiling, wall, or pendant mounting, as indicated, in steel back boxes, acoustically dampened. Front face of at least 0.0478-inch steel and whole assembly rust proofed and shop primed for field painting.
8. Flush-Ceiling Mounting Units: In steel back boxes, acoustically dampened. Metal ceiling grille with baked, white-enamel finish.

D. Horn-Type Loudspeakers: Comply with EIA SE-103.

1. Type: Single-horn units, double-reentrant design, with minimum full-range power rating of 15 W.
2. Matching Transformer: Comply with EIA-160. Full-power rated with four EIA standard taps. Maximum insertion loss of 0.5 dB.

3. Frequency Response: Within plus or minus 3 dB from 250 to 12,000 Hz.
4. Dispersion Angle: 130 by 110 degrees.
5. Mounting: Integral bracket.
6. Units in Hazardous (Classified) Locations: Listed and labeled for the environment in which they are located.

E. Volume Attenuator Stations: Wall-plate-mounted autotransformer type with paging priority feature.

1. Wattage Rating: 10 W, unless otherwise indicated.
2. Attenuation per Step: 3 dB, with positive off position.
3. Insertion Loss: 0.4 dB maximum.
4. Label: "PA Volume."

F. Microphone Outlets: Three-pole, polarized, locking-type, microphone receptacles in single-gang boxes. Equip wall outlets with a brushed stainless-steel device plate. Equip floor outlets with gray tapered rubber or plastic cable nozzles and fixed outlet covers.

G. Cable and Conductors: Cable shall be jacketed, twisted-pair 300 V power limited 2 conductor 18AWG. Use 20AWG for telephone interface.

1. Insulation for Wire in Conduit: Thermoplastic, not less than 1/32 inch thick.
2. Plenum Cable: Listed and labeled for plenum installation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install equipment to comply with manufacturer's written instructions.

B. Wiring Method: Install wiring in raceway except within consoles, desks, and counters. Conceal cable and raceway except in unfinished spaces.

C. Wiring Method: Install wiring in raceway where raceway is in an accessible location except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum-board partitions where cable wiring method may be used. Use plenum cable in environmental air spaces, including plenum ceilings. Conceal cable and raceway except in unfinished spaces.

D. Install exposed cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings so designed and installed to avoid damage to cables. Secure cable at intervals not exceeding 30 inches (760 mm) and not more than 6 inches from cabinets, boxes, or fittings.

E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.

F. Control-Circuit Wiring: Install number and size of conductors as recommended by system manufacturer for control functions indicated.

G. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

H. Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

I. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

J. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables to identify media in coordination with system wiring diagrams.

K. Wall-Mounting Outlets: Flush mounted.

L. Floor-Mounting Outlets: Conceal in floor and install cable nozzles through outlet covers. Secure outlet covers in place. Trim with carpet in carpeted areas.

M. Conductor Sizing: Unless otherwise indicated, size conductors not smaller than No. 18 AWG.

N. Weatherproof Equipment: Install units that are mounted outdoors, in damp locations, or where exposed to weather consistent with requirements of weatherproof rating.

O. Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.

3.02 GROUNDING

A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.

C. Install grounding electrodes as specified in Section 26 05 26 (16060) "Grounding and Bonding."

3.03 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installations, including connections. Report results in writing.

B. Operational Test: Perform tests that include originating program and page material at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and freedom from noise and distortion.

C. Signal-to-Noise Ratio Test: Measure the ratio of signal to noise of complete system at normal gain settings, using the following procedure:

1. Disconnect a microphone at the connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure the ratio of signal to noise.

2. Repeat test for each separately controlled zone of loudspeakers.

3. Minimum acceptance ratio is 50 dB.

D. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure the distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.

E. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use a sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in the same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.

F. Power Output Test: Measure electrical power output of each power amplifier at normal gain setting at 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

G. Signal Ground Test: Measure and report ground resistance at pubic address equipment signal ground. Comply with testing requirements specified in Division 16 Section 26 05 26 "Grounding and Bonding."

H. Retesting: Correct deficiencies, revising tap settings of speaker-line matching transformers where necessary to optimize volume and uniformity of sound levels, and retest. Prepare written record tests.

I. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

J. Schedule tests with at least seven days' advance notice of test performance.

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment as specified below:

1. Conduct training as specified in Section 01 79 00 (01820) "Training".

2. Train Owners maintenance personnel on programming equipment for starting up and shutting down, troubleshooting, servicing, and maintaining equipment.

END OF SECTION

SECTION 28 08 01 - COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS

PART 1 – GENERAL

1.01 Description

A. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.

B. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the contract documents the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing Contractors/Sub-Contractors.

2. Verify and document proper performance of equipment and systems.

3. Verify that O&M documentation left on site is complete.

4. Verify that the Owner's operating personnel are trained.

C. The commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractors/Sub-Contractors to provide a finished and fully functioning product.

D. For this project, Commissioning is not required for the Electronic Safety and Security Systems.

END OF SECTION 28 08 01

SECTION 28 16 00 (13730) - INTRUSION DETECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Intrusion Detection Sensors
2. Signal Equipment
3. System Controls
4. Alarm Displays
5. Alarm Indicating Devices

B. Related Sections:

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 53 - Identification for Electrical Systems
3. Section 26 35 33 - Power Factor Correction Equipment
4. Section 27 05 00 - Common Work Results for Communications
5. Section 28 23 00 - Video Surveillance
6. Section 28 31 00 - Fire Alarm and Detection Systems

1.02 DEFINITIONS

A. Hard-Wired System: Alarm, supervisory, and detection devices that are directly connected, through individual dedicated conductors, to central-control unit.

B. Zone: A space or area for which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between the sensors and the communication link to central-control unit.

C. LCD: Liquid-crystal display.

D. LED: Light-emitting diode.

1.03 SYSTEM DESCRIPTION

A. Microprocessor-based central controls, remote intrusion sensors and detection devices, and a communication link to perform monitoring, alarm, and control functions. System is physically and electronically modular with provision for future expansion. System is self-monitoring and self-diagnostic.

1. Communication Link: Hard wired, using separate individual circuits for each zone of alarm initiation, alarm device operation, and control.

1.04 SYSTEM FUNCTIONAL PERFORMANCE

A. Central-Control Units: Continuously, electronically supervised system components for normal, alarm, and trouble conditions. Central-control unit indicates deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.

B. System Control: Central-control unit directly monitors intrusion detection devices and circuits.

C. Alarm Indication: Audible signal sounds and a plain-language identification of zone originating the alarm appears on an LED or LCD at central-control unit. Annunciator panel displays a common alarm light and an audible tone.

D. Printed Record of Events: Print a record of alarm, supervisory, and trouble events on system printer. Sort and report by zone, device, and function. When central-control system receives a signal, print a report of alarm, supervisory, or trouble condition. Report type of signal (alarm, supervisory, or trouble), zone description, date, and time of occurrence. Differentiate alarm signals from other indications. When system is reset, report reset event with the same information concerning device, location, date, and time. Commands initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.

E. Maximum Permissible Signal Time Elapse: Two seconds between actuation of any alarm or detection and its indication at central-control unit.

F. Circuit Supervision: Central-control unit indicates circuit faults with both zone and trouble signals and makes a distinctive audible tone and illuminates an LED indicating light. Maximum permissible elapsed time between occurrence of a trouble condition and indication at central-control unit is 20 seconds.

G. Programmed Secure-Access Control: A system programmed to change status of various combinations of zones automatically between "secure" and "access" at scheduled times. Changeable schedules for status changes preset, repetitive, daily and weekly operation and special scheduled operations up to a year in advance. Manual secure-access control stations override programmed settings.

H. Manual Secure-Access Control: Coded entries at manual stations change status of associated zone between "secure" and "access."

1.05 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 indicating specified items selected for use in project.

B. Shop Drawings: Include data on custom-fabricated components. Show plans, elevations, and sections detailing installed features and devices.

1. System Wiring Diagrams: One reproducible and four prints include system diagram unique to Project. Show connections for all devices, components, and auxiliary equipment. Differentiate between manufacturer-installed and field-installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified.

C. System Operation Description: Include method of operation and supervision of each component and each type of circuit, and sequence of operations for manually and automatically initiated system inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are not acceptable.

D. Product Certificates: Signed by manufacturers of components certifying that products furnished comply with requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

F. Record of field tests of system.

G. Maintenance Data: For products and system to include in maintenance manuals specified in Division 01. Include data for each type of product, including all features and operating sequences, both automatic and manual. Include user's software data and recommendations for spare parts and components to be stocked at Project site.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A certified technician accredited by the National Burglar and Fire Alarm Association, and who is an authorized service representative of central-control unit manufacturer.

B. Manufacturer Qualifications: Central-control unit manufacturer or factory-authorized agency maintains a service center capable of providing training, parts, and emergency maintenance and repairs for overall system at Project site with 24 hours' maximum response time.

C. Testing Agency Qualifications: Comply with requirements specified in Section 01 45 00 "Quality Control." A current member firm of the National Burglar and Fire Alarm Association. Experienced in performing tests of intrusion detection systems.

1. Testing Agency's Field Supervisor: Person currently certified as an advanced alarm technician by the National Burglar and Fire Alarm Association.

D. Source Limitations: Obtain system components from central-control unit manufacturer who shall assume responsibility for system components and for their compatibility.

E. FM Compliance: FM-approved and -labeled intrusion detection devices and equipment.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

G. Comply with NFPA 70.

H. Comply with UL 1076.

1.07 SYSTEM SERVICE CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Altitude: Sea level to 4000 feet.

2. Ambient Temperature for Indoor Components: 0 to 40 deg C.

3. Relative Humidity for Indoor Components: 5 to 95 percent, non-condensing.

4. Ambient Temperature for Outdoor Components: Minus 25 to plus 50 deg C.

5. Relative Humidity for Outdoor Components: 0 to 100 percent.

1.08 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. ADT Security Systems, Inc., a Tyco International Business (800-238-8988).

B. Approved Manufacturer:

1. No substitutions accepted.

2.02 EQUIPMENT

A. Protection from Power Line Surges: Use integral surge suppressors listed in UL 1449 and complying with IEEE C62.41, Category B. Include the following features:

1. Suppression Level: 300 V.

2. Maximum Response Time: 5 nanoseconds.

3. Circuit: Multistage, using inductors and silicon-avalanche zener diodes or equivalent.

4. Indicator Lamp: Labeled neon or LED located on control unit and arranged to extinguish on failure of protection.

5. Fuses: Externally accessible.

B. System- and Equipment-Interference Resistance: Not affected by radiated-radio-frequency interference and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHZ and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHZ.

C. Tamper Protection: Tamper switches on detection devices, control units, annunciators, pull boxes, junction boxes, cabinets, and other system components indicated to provide an alarm signal when unit is opened or partially disassembled. Central-control unit identifies tamper alarms and indicates location in alarm display.

D. Products: Provide the following products subject to conformance with the requirements specified. Note: Connections shall be made to the relays (NO/NC) to provided fire alarm control panel for fire alarm and fire alarm trouble.

1. "Focus Cadet Control Dual Line Control Communicator and Standby Batteries"; ADT

   a. Location: Telephone room.

   b. Quantity: 1

2. "F-200 Interactive Operating Keypad Model ADT 471210"; ADT

   a. Location: Administrative Office vestibule area.

   b. Quantity: 1

3. Each: "Hold Up Button, ADT 472374 with Reset Tool, ADT 472374"; ADT

   a. Location: Located at each end of the Front Desk and on the work counter located in the Workroom.

   b. Quantity: 3

2.03 ELECTRICAL POWER

A. Normal System Power Supply: 120 V, 60 Hz, through a locked disconnect device. System control unit supplies power to components.

B. Power Continuity: Batteries in power supplies of control units and individual system components maintain continuous system operation during outages of both normal and backup ac system supply.

1. Batteries: Rechargeable, valve-regulated, recombinant, sealed lead-acid type with nominal 10-year life expectancy. Capacity adequate to operate portion of system served, including audible trouble signal devices for up to four hours and audible and visual alarm devices under alarm conditions for an additional 10 minutes.

2. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Charger recharges fully discharged battery within 24 hours.

C. Annunciation: Central-control unit indicates, as a change in system condition, switching of system or component to backup power.

2.04 INTRUSION DETECTION DEVICES

A. Comply with UL 639.

B. Configuration: Single or multiple components to perform indicated functions. Single-component devices may not be used where multiple-component devices are indicated.

C. Power Source: One or more dedicated power supply circuits from control unit.

D. Detection Indicator: LED in unit housing, latch type where indicated.

1. Sensitivity: Detect presence of an intruder within their zone patterns, but not outside their zone patterns.

E. Acoustical Devices: Detect intrusion by monitoring pattern of a steady-state sonic field produced by an ultrasonic transmitter. Changes in pattern are analyzed and those matching the profile of an intrusion initiate an alarm.

F. Glass-Break Devices, Acoustic Type: Detect unique airborne acoustic energy spectrum caused by breaking glass.

G. Dual-Technology, Glass-Break and Vibration Devices: Require both methods to result in an alarm signal.

2.05 CONTROL UNITS

A. Comply with UL 1076.

B. Cabinet: Lockable steel enclosure, arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for interconnecting cabinets and field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch (25 mm) high. Identify individual components and modules within cabinets with permanent labels.

C. Systems: Separate and independent alarm and supervisory systems in control units. Alarm-initiating zone boards consist of plug-in cards. Arrangements requiring removal of field wiring for module replacement are not acceptable.

D. Timing Unit: Solid state, programmable, 365 day. Features include the following:

1. Astronomic Control: For automatic adjustment of light switching at dawn and dusk.

2. Confirmation: Relays, contactors, and other control devices have auxiliary contacts connected to provide confirmation signals to the system of on or off status of the equipment controlled. Software interprets such signals, displays equipment status, and initiates failure signals.

3. Override Capability: Programmed shutdown of lighting and other items can be overridden by using override push buttons or by entering a command over a telephone data link.

E. Control Modules: Types and capacities as required to perform unit functions. Visible and audible signals in central-control unit indicate alarm, supervisory, and trouble conditions for each zone. Each type of audible alarm has a distinct sound.

F. Zones: Quantity of alarm and supervisory zones as indicated with capacity for expanding number of zones by a minimum of 25 percent.

G. Power Supply Circuits: Units provide power for remote power-consuming detection devices. Circuit capacity is adequate for at least a 25 percent increase in load.

H. Indicating Lights: Individual LED devices designate each zone. An LED test switch for each control unit section illuminates all LED devices on that section of the unit. Manual toggle test-switches or push test-buttons do not require a key to operate. Alarm and supervisory signals light a red LED for the associated zone. Trouble signals light an amber LED for the associated zone.

I. Resetting: Controls permit silencing audible signals for individual zones but prevent resetting of alarm, supervisory, or trouble signals while the condition still exists.

J. Alphanumeric Display and System Controls: Arrange for basic interface between human operator at central-control unit and system components, including annunciation, supervision, and control. A display with a minimum of 80 characters displays alarm, supervisory, and component status messages and indicates control commands to be entered into system. Arrange keypad to enter and execute control commands.

2.06 SECURE-ACCESS CONTROL STATIONS

A. Keypad: Arranged for entering and executing commands for system-status changes.

B. Key-Operated Switch: Changes zone between "secure" and "access" modes.

2.07 SYSTEM PRINTER

A. Description: Listed in UL 1610 and labeled as an integral part of intrusion detection system.

2.08 CONDUCTORS AND CABLES

A. Cable for fire panel connection shall be power limited fire alarm plenum cable 2 conductor 16AWG Red (FPLP).

B. Cable for hold-up button connections shall be power limited fire alarm plenum cable 4 conductor 22 AWG (FPLP).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install system according to NFPA 70, NFPA 72, applicable codes, and manufacturer's written instructions.

B. Comply with UL 681 and/or 1641.

C. Wiring Method: Install wiring in raceways. Conceal raceways, except in unfinished indoor spaces.

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Provide and use lacing bars and distribution spools.

E. Number of Conductors: As recommended by system manufacturer for functions indicated.

F. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

G. Connections: Comply with torque-tightening values specified in UL 486A.

H. Identify components, conductors, and cables according to Section 26 05 53 - "Identification for Electrical Systems". Color-code conductors, and apply wire and cable marking tape to designate wires and cables so media are identified and in coordination with system wiring diagrams.

I. Install power supplies and other auxiliary components for detection devices at control units, unless otherwise indicated. Do not install such items near the devices they serve. Provide tamper switches where mounted separately from control units.

J. Interface with other products: complete connection to telephone system for central station monitoring.

K. Equipment shall be firmly secured in place with supports and fastenings providing a minimum safety factor of three. Provide adequate ventilation for all equipment.

L. Security system requires two (2) loop start telephone lines in place, with RJ31X jacks and 24-hour emergency power supply.

3.02 GROUNDING

A. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

3.03 FIELD QUALITY CONTROL

A. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

B. Pre-testing: Align and adjust system and perform pre-testing of all components, wiring, and functions to verify compliance with specified requirements. Correct deficiencies by replacing malfunctioning or damaged items with new items.

C. Testing: Perform the following field quality-control testing:

D. Manufacturer's Field Services: Engage a factory-authorized service representative to inspect field-assembled components and perform system pre-testing, testing, adjustment, and programming.

1. Operational Tests: Schedule tests after pre-testing has been successfully completed. Perform operational system tests to verify compliance with Specifications. Test all modes of system operation and intrusion detection. Methodically test for detection of intrusion and for false alarms in each zone of intrusion detection. Test for false alarms by simulating activities outside indicated detection patterns.

2. Report: Prepare a written report of observations, inspection, and tests.

E. Retesting: Correct deficiencies and retest until total system meets requirements of the Specifications and complies with applicable standards.

F. Schedule testing with at least seven days' advance notice.

3.04 ADJUSTING

A. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting and reprogramming to suit actual occupied conditions. Provide up to two visits to Project for this purpose without additional cost.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to explain programming and operation of system and to train Owner's maintenance personnel on procedures and schedules for maintaining, programming, operating, adjusting, troubleshooting, and servicing system.

1. Refer to Section 01 79 00 “Demonstration and Training” for additional requirements.

END OF SECTION

SECTION 28 23 00 - VIDEO SURVEILLANCE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. CCTV Closed Circuit Television System.

B. Related Sections:

1. Section 26 05 00 - Common Work Results for Electrical
2. Section 26 05 53 - Identification for Electrical Systems
3. Section 26 35 33 - Power Factor Correction Equipment
4. Section 27 05 00 - Common Work Results for Communications
5. Section 28 16 00 – Intrusion Detection
6. Section 28 31 00 - Fire Alarm and Detection Systems

1.02 DEFINITIONS

A. CCTV: Closed Circuit Television.

1.03 SYSTEM DESCRIPTION

A. Video cameras, camera outlets, camera controls, monitors, video switches, signal processing equipment, control stations, distribution components, a videotape recorder, and accessories to generate video images, process them, and distribute them.

B. System shall display images on monitors and provide for remote control of video-camera equipment.

1.04 SUBMITTALS

A. Product Data: Include detailed manufacturer's specifications for each component specified. Include data on features, ratings, and performance.

B. Shop Drawings: For CCTV equipment. Include plans, elevations, sections, details, and attachments to other Work.

1. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

C. Product Certificates: Signed by manufacturers of CCTV equipment and components certifying that products furnished comply with requirements.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements of installed systems.

F. Maintenance Data: For CCTV equipment and components to include in maintenance manuals refer to Section 01 78 23 - “Operating and Maintenance Data” and Section 01 77 00 - "Closeout Procedures”. In addition to those requirements, include the following:

1. Detailed operating instructions covering operation under both normal and abnormal conditions.

2. Routine maintenance requirements for system components.

3. Lists of spare parts and replacement components recommended being stored at the site for ready access.

G. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the CCTV equipment manufacturer, for both installation and maintenance of units required for this Project, to supervise installation of the system.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of CCTV equipment and are based on the specific system indicated.

C. Comply with NFPA 70.

D. Comply with 47 CFR 15, 17, and 76.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: System components are equipped and rated for the environments where installed.

1. Service Conditions for Indoor Equipment: Rate equipment for continuous operation under the following environmental conditions, unless otherwise indicated:

a. Temperature: 32 deg F to 106 deg F.

b. Relative Humidity: 0 to 90 percent (non-condensing).

1.07 SEQUENCING

A. Coordinate work of this section with requirements of CCTV equipment provider.

B. Coordinate layout and installation of CCTV equipment and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

1.08 WARRANTY

A. Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. ADT Security Systems, Inc., a Tyco International Business (800-238-8988).

B. Approved Manufacturers:

1. No substitutions accepted

2.02 CCTV COMPONENTS

A. Fixed Cameras: Digital color CCD (charged-coupled-device) - Capable of producing usable video images when used with F1.2 – 3.9 mm Varifocal lens with minimum illumination of 1.2 lux @ 30IRE.

1. Acceptable Products:

"Model ICS090-CRV39A 480 line color hi resolution "; ADT/Pelco

2.	Interline Transfer Imager:	1/4-inch interline CCD chip
3.	Scanning System:	525 lines, 2:1 interlacing
4.	Horizontal Resolution:	480 TV lines, NTSC or PAL
5.	White Balance:	Automatic
6.	White Balance Range:	2500 – 9500K
7.	Iris Control Range:	1/60 to 1/100,000 second
8.	Iris Control:	Electronic/passive
9.	Gain Control:	Selectable by DIP switch (0-20 dB)
10.	Minimum Illumination:	<1.2 lux at 30 IRE, f1.2
11.	Video Output:	1 Vp-p, 75 ohms
12.	Signal-to Noise Ratio:	48 dB (AGC off)
13.	Synchronize System:	Internal or line lock
14.	Vertical Phase:	Adjustable, 0° ±120°
15.	Backlight Compensation:	Automatic: Adjusts AGC and AES
16.	Signal Processing:	Digital Signal Processing
17.	Camera-Supporting Equipment:	Rated for load in excess of the total weight supported times a minimum safety factor of two

B. Power Supply: Indoor multiple camera power supply. 120/230 Volt A/C input, 4 fused 24 Volt AC ouputs. Total current capacity 2 amps (48 volt amps)

a. "Model MCS4-2"; ADT/Pelco

C. Monitors: Color, metal cabinet units designed for continuous operation. 15-inch active TFT LCD color, multimode monitor with minimum 50 pound rated rack mount as required.

1. Acceptable Product:

a. Monitor: “Part Number PMCL315 Color LCD Monitor”; ADT/Pelco

b. Wall Mount: “Part Number PMCL WM VESA”; ADT/Pelco

2. Quantity: 1

3. Screen Size (Diagonal Dimension): 15”

4. LCD Panel Pixel Array: 1024 X 768, 75HZ.

5. Minimum Front Panel Devices and Controls: Power switch, power-on indicator, and brightness

2.	Resolution:	Up to 704 X 480 (NTSC)
3.	Images Per Second:	Up to 120 IPS at 352 X 240 resolution
4.	Settings:	Independent Channel Resolution, Quality, and Frame

		settings.
5.	Functions:	Full function Remote Agent with Administration Functions.
6.	Internal Storage:	Up to 500 GB
7.	PTZ control:	Local or remote PTZ control via Pelco D and Pelco P protocols.
8.	Remote Control:	Standard Accessory
9.	Inputs/Outputs:	4 - Audio inputs
		1 - Audio output
		4 - Alarm inputs
		1 - relay output
10.	Signal-to-Noise Ratio:	45dB for video output in the standard play mode
11.	Additional Features:	Support for Continuous, motion, alarm, and scheduled recording for maximum utilization of hard disk drives.
12.	Mounting:	Standard 19-inch electronic equipment cabinet or free standing desktop.

2.03 SIGNAL TRANSMISSION COMPONENTS

A. Cable: Coaxial cable elements have 75-ohms nominal impedance and are 100 percent factory-sweep tested to meet or exceed requirements of NFPA 70, Articles 725, 800, and 820. Cables run in environmental air spaces are listed for use in plenums.

1. CCTV Video Distribution: RG-59/U; cellular-polyethylene dielectric, bare-copper braid shield with 95 percent minimum shielding factor, No. 22 AWG stranded copper conductor; and PVC jacket.

B. CCTV Coaxial Cable Connectors: Type BNC, 75 ohms.

PART 3 EXECUTION

3.01 EXAMINATION

A. Install products in accordance with manufacturer’s recommendations.

B. Install all cable, and complete cable and power connections to all system devices.

C. Wire all system components in accordance with the National Electrical Code, NFPA and any other authority having jurisdiction.

D. All equipment shall be firmly secured in place with all supports and fastenings providing a safety factor of at least three. Provide adequate ventilation for all equipment.

3.02 INSTALLATION

A. Outdoor Installation: Comply with ANSI C2, "National Electrical Safety Code."

B. Install surge suppressors where ac-power-operated devices are not protected against voltage transients by integral surge suppressors specified in UL 1449. Install surge suppressors at the devices' power-line terminals. Comply with Section 26 35 33 - “Power Factor Correction Equipment”.

C. Wiring Method: Install cables in raceways.

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

E. Pulling Cable: Do not exceed manufacturer's recommended pulling tensions. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

F. Equalizing Video Signals: Where system performance may be degraded in certain operating modes, revise component connections and install video distribution amplifiers and attenuates as required to provide a balanced signal across the system.

G. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

H. Grounding: Provide independent signal circuit grounding recommended by manufacturer.

3.03 CCTV SYSTEM INSTALLATION

A. Install cameras at final locations defined by camera location tests. Install cameras with 84-inch minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

B. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera.

C. Install power supplies and other auxiliary components at control stations. Do not install such items near the devices they serve, unless otherwise indicated.

D. Placement:

1. CCTV Camera Placement: Mount camera to the ceiling tile in the corner behind the Front Desk that is opposite the main entrance. The purpose of the camera is to identify armed assailants standing in front of the desk. (Note: All attempts should be made to also position the camera to view persons standing near the intercom in the lobby vestibule.

2. Mount and Monitor Placement:

a. Monitor mount provided shall be installed directly under the CCTV Camera fixed with appropriate fasteners to support a minimum 14” color flat screen monitor. (Note: All attempts should be made to make the monitor conspicuously visible from the front entrance and cable/wire system correctly to always display time date stamp from the DVR CCTV # 2 Camera Placement: Mount camera within the “computer room” (room where the computer/F.O.S.S.E. server is located that contains credit card information). The camera must identify persons accessing the F.O.S.S.E. server. If the camera is not able to properly fit in the room to identify persons, then place the camera on the exterior of the room to identify persons who are exiting the room.

b. CCTV # 3 Camera Placement: Mount camera within the work room to identify persons who opens the drop safe within the room.

3. DVR Placement: The DVR shall be housed in the lock box provided and powered from the AC outlet inside the lock box. The DVR, lock box, and monitor shall be placed in the telephone equipment room directly behind the front desk. If the telephone equipment room is not within close proximity to the front desk then the DVR, lock box, and monitor shall be placed in a secured office behind the front desk. The keys shall be surrendered to the General Manager and secured according to Owner procedures.

E. DVR Programming: Set the current time and date and position display so as to not interfere with the camera field of view. The DVR should be programmed to record minimum 14 days, high resolution with minimum 4 frames per second per camera..

F. Camera Adjustments: The camera provided shall be factory set and white balanced. A manual iris, variable focus lens shall be provided. The lens should be adjusted so as to capture as much of the desk area as possible while maintaining the ability to identify a person at the counter. Adjust the iris to achieve optimal lighting with consideration given to the main entrance diffusing sunlight toward the camera.

3.04 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Section 26 05 53 - "Identification for Electrical Systems".

3.05 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to perform field quality control testing.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation and supervise pre-testing, testing, and adjusting of CCTV equipment.

C. Inspection: Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

D. Pre-testing: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Replace malfunctioning or damaged items. Retest until satisfactory performance and conditions are achieved. Prepare CCTV equipment for acceptance and operational testing as follows:

1. CCTV Sources: Connect the receiver to the output of each CCTV signal source or the distribution amplifier associated with it.

E. Test Schedule: Schedule tests after pre-testing has successfully been completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days notice of test schedule to Owner's Representative.

F. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

G. CCTV Camera Location Test: Temporarily support each camera at the indicated location and connect to monitor. Adjust camera location and mounting and substitute fixed lenses to provide required performance at monitor. Adjust locations within 15 feet of those indicated.

H. Record test results.

I. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.06 CLEANING

A. Clean installed items using methods and materials recommended by manufacturer.

B. Clean CCTV system components, camera housing windows, lenses, and monitor screens.

3.07 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain CCTV equipment.

1. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining equipment.

2. Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.
3. Demonstrate programming and tuning of satellite receivers.
4. Conduct training as specified in Section 01 79 00 - "Demonstration and Training".

3.08 ON-SITE ASSISTANCE

A. Occupancy Adjustments: When requested by Owner within one year of date of Substantial Completion, provide on-site assistance in tuning and adjusting the system to suit actual occupied conditions and to optimize performance. Provide up to two adjustments at Project site for this purpose, without additional cost.

END OF SECTION

SECTION 28 31 00 - FIRE ALARM AND DETECTION SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Automatic and Manual Fire Alarm System, complete per NFPA 70, 72, and 101 and applicable local, state and national codes

2. The Contract Documents are to relay minimum design intent. It is the Contractor's responsibility to provide a complete approved and operable system.

3. The Contractor shall supply an addressable system to comply with this specification.

B. Related Documents:

1. Marriott's Fire Protection and Life Safety Design Standards (Module 14):

a. Marriott's Fire Protection and Life Safety Design Standards apply to all Marriott International Brands and owned, managed and franchised properties.

b. Marriott's Fire Protection and Life Safety Design Standards include Design Standards, performance criteria, reference standards and life safety process verification that define a comprehensive fire protection program.

C. Related Sections:

1. Section 14 24 23 (14240) – Elevators.

2. Section 21 10 00 (13900) - Fire Protection.

3. Section 26 60 00 (16580) – Lighting Accessories: Hearing Impaired Door Annunciator

4. Section 27 05 00 (16050) – Common Work Results for Electrical

1.02 SYSTEM DESCRIPTION

A. General: Non-coded point addressable-analog system with manual and automatic alarm initiation; automatic sensitivity control and monitoring of certain smoke detectors; and multiplexed signal transmission dedicated to fire alarm service only.

B. Automatic and selective fire alarm notification using vibrating electric horn (with strobe where required) to all occupiable spaces including each guestroom. Horns shall sound at temporal march-time.

C. Activation of any standpipe or sprinkler tamper switch shall activate a distinctive system audible supervisory signal and illuminate a valve tamper LED at the system controls (so that there shall be no confusion between valve tamper activation and opens and/or ground on fire alarm initiation wiring) and visually indicate the type of device at the graphic annunciator on an addressable system.

D. All manual controls shall be supervised so that all switches must be returned to the normal automatic position to clear system supervisory signal.

E. Each independently supervised circuit shall include a discrete amber "Trouble" LED to indicate disarrangement conditions per circuit.

F. Supervise the incoming power to the system so that any power failure shall be audibly and visually indicated at both the control panel and the graphic annunciator.

G. Provide low/high air supervisory signal for dry automatic sprinkler system.

H. Provide running, power fault, and phase reversal trouble signals for diesel fire pump.

I. Provide signal circuit and auxiliary function disconnect capability by disconnect switch or keypad to facilitate testing without disruption.

1. Provide the following at the FACP:

a. Disconnect switches to disable notification, audible appliances, visual strobes, and auxiliary function points for testing purposes.

b. Alarm sensitivity testing at the FACP.

J. Provide all zones or alphanumeric point of address designations in property operation's terminology.

1.03 SUBMITTALS

A. Refer to Section 01 33 00 (01330) - Submittals: Procedures for submittals

1. Product Data:

a. Provide submittals in accordance with the requirements of Section 01 33 00 (01330).

B. Provide Marriott's Fire Protection Department and Engineer with 2 sets of system plans and equipment data sheets by a licensed Fire Alarm Contractor for review and approval prior to installation.

C. Forward subsequent changes to Marriott Fire Protection for final approval.

D. Record Documents:

1. Refer to Section 01 78 39 (01785) - Project Record Documents and Section 01 78 23 (01830) - Operating and Maintenance Data for required closeout documents to be provided at completion of Project. In addition to the documents listed in these Sections, the following documents shall be included:

a. Provide NFPA 72 test certification.

b. Record Documents shall include System Drawings, Equipment Data and Operation Instructions, and Maintenance Instruction Manuals.

1.04 QUALITY ASSURANCE

A. Equipment shall be manufactured by a firm who has been actively manufacturing fire alarm systems of the type required and shall have supplied similar equipment to comparable installations and rendered satisfactory service for a minimum of 10 years. All components of the fire alarm system shall be manufactured by the vendor supplying the equipment, and standard products of a single manufacturer.

B. Equipment manufacturer shall maintain factory trained personnel within 50 miles of the project site and shall be available 24 hours per day.

C. Material and equipment shall be new and UL listed.

1.05 EXTRA MATERIALS

A. Furnish extra materials described in Section 01 78 43 (01790) - "Spare Parts and Materials" that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Avendra, LLC Preferred Manufacturers:

1. None.

B. Approved Manufacturers:

1. ADT – Tyco Fire & Security (888-238-8988)
2. GE Security – Edwards System Technology (EST) (314-302-0291)
3. Honeywell Fire Systems – Gamewell/FCI (Platinum Systems Distributor), Notifier (NESCO); Farenhyt by Silent Knight; Fire-Lite Alarm (800-656-3726))
4. Siemens (Cerbeus, Pyrotronics Faraday) – Siemens Fire Safety (201-266-4516)
5. SimplexGrinnell –Tyco Fire & Security (978-731-7352/800-746-7539)
6. Mircom (816-628-5348)
7. VES (Formely Viking Electronic Services) (610-955-2464)
8. Hochiki America Corporation (281-826-0165)

2.02 MATERIALS

A. Fire Alarm Control Panel

1. Control Panel: Modular, solid state addressable.
2. Locate fire alarm control panel or annunciator in a location attended continuously by property associates.
3. The control panel shall contain modules which have the capability to perform the following functions.
   a. Mount batteries in the control panel. Battery capacity shall be sufficient to provide for the entire system upon loss of normal 120 volt power for a period of twenty-four (24) hours with ten (10) minutes of alarm indication at the end of this period.
   b. Control panel to include contacts for alarm and trouble connections to an approved Central Station. If required by Local Code, a municipal tie module shall be provided in lieu of the contacts for central station connection. Module shall be selected to be compatible with local city system.
   c. Basic Fire Alarm Panel and Cabinet to house and power the listed modules and components.

B. Smoke Sensors (Detectors):

1. Guestrooms, Suite Rooms and other Sleeping Units
   a. Provide smoke sensors with sounder bases to meet the following:
      1) Photoelectric type sensor.
      2) Sounder Base: Provide minimum audible alarm of 85 dBA at 10 feet; minimum of 75 dBA “at the pillow”.
      3) Activation of room smoke sensor to immediately and automatically sound an alarm within the room of incident.
      4) System smoke sensor normal and emergency power is provided by the FACP.
      5) In Suites or other mixed Sleeping / Living Units, provide smoke sensors in each separate sleeping / living rooms (or in areas providing access to the corridor doorway). Multiple sensor sounder bases located within the same suite or unit shall sound at the same time.
2. Guestroom Smoke Alarms (Handicap Accessible and Hearing Impaired): Same as above with the following additions.
   a. Visible Alarm Device: Xenon Strobe. Activation of detector to cause both alarm horn and visible alarm device (xenon strobe) to flash.

3. Smoke Detectors / Sensors are to be located per NFPA 72 so that the function is not to be compromised by air flow to or from grilles or ceiling fans.

4. Guestroom Smoke Sensors or Smoke Alarms are to be audibly and visually annunciated at the FACP and annunciators as Supervisory Signals.

C. Smoke Detectors - All Other Areas:

1. System Smoke Detectors: Photoelectric or ionization type for corridors and other areas, incorporating ability to be remotely tested by addressable system.

a. Finish: Manufacturer's standard beige/off-white.

D. Alarm Initiating Devices:

1. All initiating devices to be “point” addressable.

2. Manual Pull Stations: High impact Lexan, which will latch upon operation and remain latched until reset with a key. Locate at front desk only, unless required in other locations by applicable codes.

a. Color: White with red lettering

3. Duct Smoke Sensors: Complete with a keyed ceiling mounted remote test switch with alarm lamp, wall mounted not higher than 80 inches above finished floor.

a. Point addressable duct smoke sensors are to be installed at locations in supply and/or return air ducts of all air handling systems 2000 CFM or greater, or as required by local codes.

4. Heat Detectors: Rate-of-rise and automatically restorable.

5. Carbon Monoxide Detectors: Provide carbon monoxide detectors in mechanical rooms containing gas fired water heaters and in guestrooms, public spaces, and any location with gas fired fireplaces or other gas appliances. Connect so that detectors provide Supervisory alarm at Fire Alarm Control Panel (FACP).

6. Sprinkler water flow alarm/dry system pressure switch.

7. Low/High air alarm for dry system.

E. Alarm Notification Appliances (Low Rise Building)

1. Mini Horns/Sounder Bases:

a. Guestrooms: Install in all guestrooms, and in bedrooms of all suites, beige in color.

b. Smoke Sensors with sounder bases may be installed in lieu of guestroom mini horns provided the sounder base meets the following requirements:

1) Approval from the local authority having jurisdiction.

2) Listed for general and local evacuation.

3) Capable of sounding both the local in-room alarm upon activation of the in-room / suite smoke sensor(s) and upon activation of the building fire alarm notification system.

2. Horns and Strobes:

a. Public areas: Use horns with strobes, White in color.

b. Back of House: Use horns with strobes, White in color.

c. Accessible and Hearing-Impaired Guestrooms: Flashing lights for the hearing impaired shall be semi-recessed, with side-viewing tamper-proof lens. White lens with the word "Fire" in raised red letters. Flashing lights may be an integral part of

the accessible guestroom detector and/or mini horn or may be a separate flashing device. Flashing lights shall be located in all sleeping areas, living areas and bathrooms.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install system in accordance with all national, state and local codes, UL standards, and the manufacturer's published instructions.

B. Provide necessary materials and appurtenances, including coordination with the Owner concerning a complete and timely central system tie-in between the fire alarm system and the local fire department or jurisdictional authority when required by Public Authorities. A functional test of the tie-in shall be demonstrated during the final fire alarm system testing.

C. Be responsible for designing and installing as complete fire alarm system that meets all codes.

D. Coordinate devices that pertain to other work in the contract with the appropriate trades.

E. Sprinkler flow and tamper switches will be furnished and installed under Section 21 10 00 (13900). The Electrical subcontractor shall be responsible for wiring and connection to sprinkler switches.

F. Cover smoke detectors to prevent contamination by dust, and keep covered until Substantial Completion.

G. Provide duct detectors under the fire alarm system as required by code. Provide ceiling mounted remote test switch with indicator light for each duct detector.

H. Provide connectors and signals from devices in the elevator shaft, machine room, and landings to the elevator controller to complete activation and shutdown events required per ASME/ANSI A17.1, Standard Safety Code for Elevators and Escalators.

3.02 TESTING

A. The fire alarm system shall be pre-tested and certified by the fire alarm vendor per NFPA 72 (National Fire Alarm Code) prior to acceptance testing. A copy of the manufacturer representative's certification report shall be made available to the Marriott Representative and code official prior to the acceptance test by Marriott Corporate Fire Protection of the Code Official.

B. Test completed system in the presence of the Public Authority and Marriott’s Fire Protection Department.

C. Provide equipment necessary to perform testing.

D. Refer to Submittals Paragraph for required certifications and documents to be provided with closeout documents.

3.03 TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

1. Conduct training as specified in Section 01820 (01 79 00) - "Training”.

2. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining system.

END OF SECTION

SECTION 32 13 16 - DECORATIVE CONCRETE PAVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Stamped concrete.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 – Cast-in-Place Concrete.

1.3 REFERENCE STANDARDS

A. ASTM C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

B. ASTM C 979 – Standard Specification for Pigments for Integrally Colored Concrete.

1.4 SUBMITTALS

A. Comply with Section 01 33 00 – Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including preparation and application instructions.

C. Samples: Submit manufacturer's samples of standard colors.

D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

E. Applicator's Project References: Submit applicator's list of successfully completed stamped concrete projects, including project name and location, name of architect, and type and quantity of materials applied.

1.5 QUALITY ASSURANCE

A. Applicator's Qualifications:
   1. Applicator regularly engaged, for preceding 5 years, in application of stamped concrete of similar type to that specified.
   2. Employ persons trained for application of stamped concrete.

B. Mock-ups:
   1. Construct Mock-ups of Stamped Concrete:
      a. Use same materials and methods for use in the Work.
      b. Location: Determined by Architect.
      c. Minimum Size: 4 feet by 4 feet.
   2. Receive approval of mock-ups by Architect for patterns, colors, textures, finishing, curing, cleaning, sealing, special effects, and workmanship before application of stamped concrete.
   3. Approved Mock-ups:
      a. Standard for patterns, colors, textures, finishing, curing, sealing, special effects, and workmanship of stamped concrete.
      b. Retain through completion of Work for use as quality standard.

C. Pre-application Meeting:
   1. Convene pre-application meeting before start of application of stamped concrete.
   2. Require attendance of parties directly affecting work of this section, including:
      a. Contractor.
      b. Architect.
      c. Landscape architect.
      d. Applicator.
      e. Manufacturer's representative.
   3. Review:
      a. Mock-ups.
      b. Materials.
      c. Preparation.
      d. Application.
      e. Finishing.
      f. Curing.
      g. Cleaning.
      h. Sealing.
      i. Protection.
      j. Coordination with other work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:
   1. Store and handle materials in accordance with manufacturer's instructions.
   2. Keep materials in manufacturer's original, unopened containers and packaging until application.
   3. Store materials in clean, dry area indoors.
   4. Store materials out of direct sunlight.
   5. Keep materials from freezing.
   6. Protect materials during storage, handling, and application to prevent contamination or damage.

1.7 AMBIENT CONDITIONS

A. Apply materials when air and surface temperatures are between 55 degrees F (13 degrees C) and 80 degrees F (27 degrees C).

B. Do not apply materials when rain, snow, or excessive moisture is expected during application or within 24 hours after application.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Brickform, 11061 Jersey Boulevard, Rancho Cucamonga, California 91730. Toll Free 800-483-9628. Phone 909-484-3399. Fax 909-484-3318. Website www.brickform.com. E-mail info@brickform.com.

2.2 MATERIALS

A. Concrete Topping and Hardener: Brickform “Color Hardener”.

1. Color: As selected by Architect from manufacturer's full range

B. Colorless Bond Breaker: Brickform “Liquid Release”.

C. Stamping Mats: Brickform “Creative Image Mats”.

1. Model Number: TM-1500, Red Yellow, and Blue.
2. Pattern: Verona Stone.

D. Curing Compound:
1. Clear, non-yellowing, non-staining, breathable, UV stable.
2. Compliance: ASTM C 309.
3. Compatible with colored concrete.

E. Concrete Cleaner: Brickform “Antique Release/Efflorescence Remover”.
1. Biodegradable.

F. Sealer:

1. Low-Sheen Sealer with Traction Grip: Brickform “Safety-Seal”.
   a. Slip-resistant, UV-resistant, lacquer-based, acrylic, clear sealer.
   b. VOC: [100 g/L] [400 g/L] [650 g/L].
2. Satin-Finish Sealer: Brickform “Satin-Seal”.
   a. Natural-look, water-based, acrylic, clear sealer.
   b. VOC: 100 g/L.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive stamped concrete.

B. Notify Architect of conditions that would adversely affect application or subsequent use.

C. Do not begin preparation or application until unacceptable conditions are corrected.

3.2 PREPARATION

A. Protection of In-Place Conditions: Protect adjacent surfaces, areas, adjoining walls, and landscaping from contact with stamped concrete materials.

B. Preparation of Subgrade:
1. Ensure subgrade is uniformly graded, compacted, and moistened.
2. Ensure subgrade is free of standing water.
3. Do not place concrete over soft, frozen, or muddy subgrade.

C. Concrete:

1. Specified in Section 03 30 00, unless otherwise specified in this section.
2. Slump: Maximum 4 inches.
3. Calcium Chloride: Do not use calcium chloride or admixtures containing calcium chloride.
4. Fine and Course Aggregates:
   a. Non-reactive.
   b. Free of deleterious material.

3.3 APPLICATION

A. Apply stamped concrete materials in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Concrete Topping and Hardener:
1. Apply concrete topping and hardener in accordance with manufacturer's instructions.
2. Apply concrete topping and hardener to give complete and uniform coverage to concrete.
3. Ensure uniform color results.

E. Colorless Bond Breaker:
1. Apply colorless bond breaker in accordance with manufacturer's instructions to bottom of stamping mats and on concrete surface, when concrete has reached plastic stage desirable for imprinting.
2. Do not trowel or mix colorless bond breaker into plastic concrete surface.

F. Stamping Mats:
1. Press stamping mats in accordance with manufacturer's instructions into concrete that has reached plastic stage desirable for imprinting.
2. Use stamping mats to create patterns in concrete as indicated on the Drawings.

G. Approved Mock-ups: Match approved mock-ups for patterns, colors, textures, finishing, curing, cleaning, sealing, special effects, and workmanship.

3.4 CURING

A. Cure concrete in accordance with manufacturer's instructions.

B. Apply curing compound in accordance with manufacturer's instructions.

C. Do not cure concrete using materials or methods harmful to concrete surface, including:
1. Low-pressure or high-pressure steam.
2. Burlap.
3. Plastic sheeting.
4. Membrane paper.
5. Water misting.
6. Sodium-silicone-type hardeners.

3.5 CLEANING

A. Clean concrete in accordance with manufacturer's instructions.

B. Apply concrete cleaner in accordance with manufacturer's instructions to remove:
1. Excess colored bond breaker/antiquing release agent.
2. Efflorescence.
3. Cement scale.

C. Apply concrete cleaner before sealing concrete surface.

3.6 SEALING

A. Seal concrete surfaces in accordance with manufacturer's instructions.

B. Apply sealer to clean and dry concrete surfaces in accordance with manufacturer's instructions after concrete has cured a minimum of 28 days.

C. Apply sealer uniformly over entire stamped concrete surface.

D. Do not allow traffic on finished sealed surfaces for the following periods after application:
   1. Foot Traffic: Minimum 24 hours.
   2. Heavy Traffic: Minimum 72 hours.

3.7 PROTECTION

B. Exterior Surfaces: Protect applied stamped concrete to ensure that, except for normal weathering, concrete will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 32 13 16

SECTION 32 31 29 - WOOD FENCES AND GATES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wood Fences and Gates

B. Related Sections:

1. Section 09 90 00 - Painting: Painting steel gates
2. Section 31 20 00 – Earth Moving

1.02 REFERENCES

A. American Society of Testing Materials (ASTM):

1. ASTM A36 “Standard Specification for Carbon Structural Steel”
2. ASTM A123 “Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products’
3. ASTM A153 "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"
4. ASTM A500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes"

B. American Welding Society (AWS)

1. AWS D1.1 "Structural Welding Code - Steel"

1.03 SUBMITTALS

A. Submit “Letter of Conformance” in accordance with Section 01 33 00 and with the following supporting data:

1. Product Data and manufacturer’s written instructions for care, installation and maintenance.

B. Shop Drawings:

1. Show Dimensions, fencing layout, finish, weight and size of members, methods of fastening, and installation details of fence and gates. Provide coordination drawings where inserts or sleeves are required.

PART 2 PRODUCTS

2.01 WOOD FENCES AND GATES

A. Wood Materials: treated Southern Yellow Pine; SPIB and Rough Sawn Poplar; NHLA as indicated:

1. Fence (Slats) Boards and Trim: Surfaced One Side, Two Edges (S1S2E); Standard Grade and Better; size and location as indicated on Drawings.
2. Horizontal Supports: Rough Sawn; Custom Knotty Grade; size and location as indicated on Drawings.
3. Posts: treated Southern Yellow Pine; No. 2 Grade and Better; size and location as indicated on Drawings.

4. Finish: As shown on Exterior Finish Index.

B. Steel Framed Gate Materials:

1. Steel tubes: ASTM A500
2. Angles: ASTM A36
3. Plates: ASTM A36
4. Bolts, Nuts, Screws, Clips and Washers: AISI 300 series stainless steel. Exposed screws shall be Phillip's flat head, countersunk unless noted otherwise.
5. Bolts for Field Connections Only: Provide washers under heads and nuts bearing on wood. Draw nuts tight and nick threads of permanent connections. Use beveled washers where bearing is on sloped surfaces.
6. Welding: As permitted by AWS Code D1.1.
7. Steel Finish: Paint as specified in Section 09 90 00. Color to match adjacent enclosure.

C. Fasteners:

1. Nails:
   a. Flat head aluminum with ring or spiral-threaded shank and blunt point.
   b. Length sufficient to penetrate into support framing a minimum of 1-1/2 inch.
2. Bolts and Washers: Hot-dip galvanized in accordance with ASTM A153, unless noted otherwise.
3. Concrete Anchors:
   a. Avendra, LLC Preferred Manufacturers:
      1) None
   b. Approved Manufacturers:
      1) "Red-Head"; ITW Ramset/Redhead (800-899-7890)
      2) "Wej-It"; United Inds. Metals Group (800-952-5063)
      3) Approved substitution
   c. Galvanized machine screws or bolts with standard expansion shield.
4. Adjustable (Wood) Post Base:
   a. Avendra, LLC Preferred Manufacturers:
      1) None
   b. Approved Manufacturers:
      1) "AB Series"; Simpson Strong-Tie Company, Inc. (800-999-5099)
      2) Approved substitution
   c. Galvanized steel slotted plate and spacer

D. Gate Hardware:

1. Avendra, LLC Preferred Manufacturers:
   a. None
2. Approved Manufacturers:

a. Stanley Hardware (800-337-4393)

3. Wood Gates:
   a. Hinges: #SC908BP, 1-1/2 pair per leaf.
   b. Slide Bolt: #SP1271, Slide Bolt, 1 each.
   c. Cane Bolt: #CD1009, 1 per leaf.
4. Steel Framed Gates:
   a. Hinges: Ball bearing, galvanized, 1-1/2 pair per leaf.
   b. Latch: Industrial double drive latch assembly with locking device.
   c. Cane Bolt: #CD1009, 1 per leaf.

PART 3 EXECUTION

3.01 INSTALLATION

A. Construct plumb, square, level and anchored securely with smooth miters and field cuts after joining. Provide adequate support for anchoring.

B. Install gates plumb, level, and secure for full opening without interference. Adjust hardware for smooth operation.

C. Set posts in concrete footings as shown on Drawings.

D. Expansion Bolts:
   1. Install in snug fittings, smoothly drilled holes in accordance with the manufacturer's written instructions.
   2. Place bolts so load acts in shear.

END OF SECTION

Revision Log