

# PROJECT MANUAL

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## BUFORD WATER WORKS REPLACEMENT

VOLUME I

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FOR THE

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SECTION 000107 - SEALS PAGE

DESIGN PROFESSIONALS OF RECORD

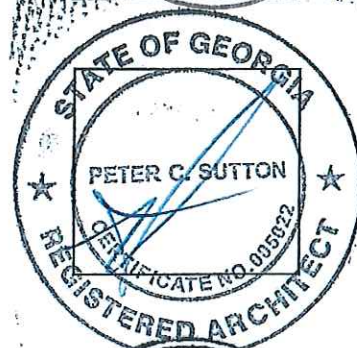
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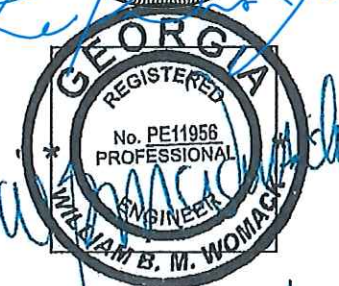
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END OF SECTION

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**SECTION 000110 - TABLE OF CONTENTS**

**VOLUME I**

<b>DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS</b>	<b><u>PAGES</u></b>	<b><u>DATE</u></b>
000100 - Project Title Page, Volume I	1 Thru 1	04/14/2021
000107 - Seals Page	1 Thru 1	04/14/2021
000110 - Table of Contents	1 Thru 8	04/14/2021
000115 - Index of Drawings	1 Thru 5	04/14/2021
001113 - Advertisement for Bids	1 Thru 1	04/14/2021
002100 - Instructions to Bidders	1 Thru 9	04/14/2021
004100 - Bid Form	1 Thru 11	04/14/2021
004310 - Bid Bond	1 Thru 2	04/14/2021
005100 - Notice of Award	1 Thru 1	04/14/2021
005200 - Agreement Form	1 Thru 6	04/14/2021
005410 - Certificate of Owner's Attorney	1 Thru 1	04/14/2021
005500 - Notice to Proceed	1 Thru 1	04/14/2021
006110 - Performance Bond	1 Thru 4	04/14/2021
006115 - Payment Bond	1 Thru 4	04/14/2021
006276 - Contractors Application for Payment	1 Thru 4	04/14/2021
005616 - Certificate of Substantial Completion	1 Thru 1	04/14/2021
007000 - General Conditions	1 Thru 62	04/14/2021
008000 - Supplementary Conditions	1 Thru 7	04/14/2021
009439 - Field Order	1 Thru 1	04/14/2021
009463 - Change Order	1 Thru 1	04/14/2021
<b>DIVISION 01 -- GENERAL REQUIREMENTS</b>		
011000 - Summary	1 Thru 3	04/14/2021
012000 - Price and Payment Procedures	1 Thru 3	04/14/2021
012100 - Allowances	1 Thru 3	04/14/2021
012200 - Unit Prices	1 Thru 2	04/14/2021
012300 - Alternates	1 Thru 1	04/14/2021
012500 - Substitution Procedures	1 Thru 2	04/14/2021
012600 - Contract Modification Procedures	1 Thru 2	04/14/2021
013000 - Administrative Requirements	1 Thru 9	04/14/2021
013216 - Construction Progress Schedule	1 Thru 2	04/14/2021
013233 - Photographic Documentation	1 Thru 2	04/14/2021
013330 - Structural Submittals	1 Thru 4	04/14/2021
014000 - Quality Requirements	1 Thru 6	04/14/2021

014219 - Reference Standards	1 Thru 8	04/14/2021
014525 - Structural Testing/Inspection Agency Services	1 Thru 15	04/14/2021
015000 - Temporary Facilities and Controls	1 Thru 7	04/14/2021
015630 - Temporary Sediment and Erosion Control	1 Thru 6	04/14/2021
016000 - Product Requirements	1 Thru 3	04/14/2021
017000 - Execution	1 Thru 8	04/14/2021
017419 - Construction Waste Management and Disposal	1 Thru 3	04/14/2021
017800 - Closeout Submittals	1 Thru 4	04/14/2021
017900 - Demonstration and Training	1 Thru 3	04/14/2021
019113 - General Commissioning Requirements	1 Thru 8	04/14/2021

**DIVISION 02 -- EXISTING CONDITIONS**

024100 - Demolition	1 Thru 5	04/14/2021
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**DIVISION 03 -- CONCRETE**

031000 - Concrete Formwork	1 Thru 4	04/14/2021
032000 - Concrete Reinforcement	1 Thru 3	04/14/2021
033000 - Cast-in-Place Concrete	1 Thru 8	04/14/2021
033713 - Shotcrete	1 Thru 4	04/14/2021
034100 - Precast Concrete Units	1 Thru 4	04/14/2021
036200 - Nonshrink Grout	1 Thru 2	04/14/2021

**DIVISION 04 -- MASONRY**

042000 - Unit Masonry	1 Thru 13	04/14/2021
042200 - Structural Concrete Masonry	1 Thru 5	04/14/2021
042613 - Masonry Veneer	1 Thru 11	04/14/2021
047200 - Cast Stone Masonry	1 Thru 4	04/14/2021

**DIVISION 05 -- METALS**

051300 - Structural Stainless Steel	1 Thru 7	04/14/2021
055000 - Metal Fabrications	1 Thru 10	04/14/2021
055133 - Metal Ladders	1 Thru 3	04/14/2021
055213 - Pipe and Tube Railings	1 Thru 7	04/14/2021
055313 - Bar Gratings	1 Thru 3	04/14/2021
057100 - Pre-Fab Interior Metal Stairs	1 Thru 6	04/14/2021

**DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES**

061053 - Miscellaneous Rough Carpentry	1 Thru 5	04/14/2021
061600 - Sheathing	1 Thru 3	04/14/2021
064116 - Plastic-Laminate-Clad Architectural Cabinets	1 Thru 5	04/14/2021
067301 - Fiberglass Reinforced Plastic (FRP) Grating	1 Thru 3	04/14/2021
068400 - Fiberglass Reinforced Plastic (FRP) Ladders	1 Thru 4	04/14/2021

**DIVISION 07 -- THERMAL AND MOISTURE PROTECTION**

071416– Cold Fluid-Applied Waterproofing	1 Thru 4	04/14/2021
072100 - Thermal Insulation	1 Thru 4	04/14/2021
072413 – Polymer-Based Exterior Insulation and Finish Systems (EIFS)	1 Thru 5	04/14/2021
074113.16 – Standing-Seam metal Roof Panels	1 Thru 7	04/14/2021
074213.13 – Formed Metal Wall Panels	1 Thru 5	04/14/2021
075423 – Thermoplastic-Polyolefin (TPO) Roofing	1 Thru 9	04/14/2021
076200 - Sheet Metal Flashing and Trim	1 Thru 14	04/14/2021
077200 - Roof Accessories	1 Thru 5	04/14/2021
078413 – Penetration Firestopping	1 Thru 4	04/14/2021
078443 – Joint Firestopping	1 Thru 3	04/14/2021
079200 - Joint Sealants	1 Thru 7	04/14/2021

**DIVISION 08 -- OPENINGS**

081113 - Hollow Metal Doors and Frames	1 Thru 7	04/14/2021
081416 - Flush Wood Doors	1 Thru 6	04/14/2021
082200 – FRP Doors and Frames	1 Thru 7	04/14/2021
083100 - Access Doors and Panels	1 Thru 2	04/14/2021
083323 - Overhead Coiling Doors	1 Thru 6	04/14/2021
084313 - Aluminum-Framed Storefronts	1 Thru 10	04/14/2021
085119 – Stainless Steel Windows	1 Thru 4	04/14/2021
085413 – Fiberglass Windows	1 Thru 4	04/14/2021
087100 - Door Hardware	1 Thru 21	04/14/2021
088000 - Glazing	1 Thru 8	04/14/2021
088813 – Fire-Rated Glazing	1 Thru 5	04/14/2021

**DIVISION 09 -- FINISHES**

092116.23 - Gypsum Board Shaft Wall Assemblies	1 Thru 3	04/14/2021
092216 - Non-Structural Metal Framing	1 Thru 5	04/14/2021
092900 – Gypsum Board	1 Thru 5	04/14/2021
095113 - Acoustical Panel Ceilings	1 Thru 4	04/14/2021
096513 - Resilient Base and Accessories	1 Thru 3	04/14/2021
096519 - Resilient Tile Flooring	1 Thru 4	04/14/2021
096813 – Tile Carpeting	1 Thru 4	04/14/2021
099113 - Exterior Painting	1 Thru 4	04/14/2021
099123 - Interior Painting	1 Thru 4	04/14/2021
099600 - High-Performance Coatings	1 Thru 7	04/14/2021

**DIVISION 10 -- SPECIALTIES**

101419 – Dimensional Letter Signage	1 Thru 4	04/14/2021
101423.16 – Room-Identification Panel Signage	1 Thru 4	04/14/2021
102800 – Toilet, Bath, and Laundry Accessories	1 Thru 3	04/14/2021
104416 – Fire Extinguishers	1 Thru 3	04/14/2021
105113 - Metal Lockers	1 Thru 5	04/14/2021

**DIVISION 11 -- EQUIPMENT**

115300 - Laboratory Equipment	1 Thru 7	04/14/2021
115313 - Laboratory Fume Hoods and Biosafety Cabinets	1 Thru 11	04/14/2021

**DIVISION 12 -- FURNISHINGS**

122413 – Roller Window Shades	1 Thru 3	04/14/2021
123553.19 - Wood Laboratory Casework	1 Thru 5	04/14/2021



**VOLUME II**

000100 - Project Title Page, Volume II	1 Thru 1	04/14/2021
<b>DIVISION 14 -- CONVEYING EQUIPMENT</b>	<b><u>PAGES</u></b>	<b><u>DATE</u></b>
144001 - Bridge Cranes	1 Thru 5	04/14/2021
144002 - Hoists, Trolleys, and Monorails	1 Thru 5	04/14/2021
<b>DIVISION 21 -- FIRE SUPPRESSION</b>		
211313 -- Wet Pipe Fire Sprinkler Systems	1 Thru 12	04/14/2021
211316 -- Dry Pipe Fire Sprinkler System	1 Thru 4	04/14/2021
<b>DIVISION 22 -- PLUMBING</b>		
220503 -- Pipes and Tubes for Plumbing Piping and Equipment	1 Thru 3	04/14/2021
220523 - General-Duty Valves for Plumbing Piping	1 Thru 2	04/14/2021
220529 - Hangers and Supports for Plumbing Piping and Equipment	1 Thru 9	04/14/2021
220548 -- Vibration and Seismic Control for Plumbing Piping and Equipment	1 Thru 5	04/14/2021
220553 -- Identification for Plumbing Piping and Equipment	1 Thru 2	04/14/2021
220700 -- Plumbing Insulation	1 Thru 7	04/14/2021
224000 -- Plumbing Fixtures	1 Thru 2	04/14/2021
224500 -- Emergency Plumbing Fixtures	1 Thru 2	04/14/2021
<b>DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)</b>		
230513 - Common Motor Requirements for HVAC Equipment	1 Thru 3	04/14/2021
230529 - Hangers and Supports for HVAC Piping and Equipment	1 Thru 8	04/14/2021
230553 - Identification for HVAC Piping and Equipment	1 Thru 5	04/14/2021
230593 - Testing, Adjusting, and Balancing for HVAC	1 Thru 2	04/14/2021
230700 - HVAC Insulation	1 Thru 14	04/14/2021
233100 - HVAC Ducts and Casings	1 Thru 6	04/14/2021
233300 - Air Duct Accessories	1 Thru 5	04/14/2021
233700 - Air Outlets and Inlets	1 Thru 6	04/14/2021
<b>DIVISION 26 -- ELECTRICAL</b>		
266010 -- Electrical General Requirements	1 Thru 6	04/14/2021
266100 -- Basic Materials and Methods	1 Thru 6	04/14/2021
266231 -- Emergency Generator	1 Thru 7	04/14/2021
266400 -- Electrical Service and Distribution Equipment	1 Thru 6	04/14/2021
266432 -- Variable Frequency Motor Controllers	1 Thru 6	04/14/2021
266450 -- Grounding	1 Thru 2	04/14/2021

266500 – Lighting Fixtures	1 Thru 2	04/14/2021
266700 – Auxiliary Systems	1 Thru 5	04/14/2021

**DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY**

281000 - Access Control	1 Thru 1	04/14/2021
282000 - Video Surveillance	1 Thru 1	04/14/2021
283111 - Building Intrusion Detection	1 Thru 1	04/14/2021

**DIVISION 31 -- EARTHWORK**

311000 - Site Clearing	1 Thru 4	04/14/2021
312200 - Grading	1 Thru 5	04/14/2021
312316 - Excavation	1 Thru 5	04/14/2021
312316.13 - Trenching	1 Thru 5	04/14/2021
312316.26 - Rock Removal	1 Thru 2	04/14/2021
312323 - Fill	1 Thru 8	04/14/2021

**DIVISION 32 -- EXTERIOR IMPROVEMENTS**

320190 - Operation and Maintenance of Planting	1 Thru 5	04/14/2021
321216 - Asphalt Paving	1 Thru 3	04/14/2021
321313 - Concrete Paving	1 Thru 5	04/14/2021
321723.13 - Painted Pavement Markings	1 Thru 3	04/14/2021
323113 - Chain Link Fences and Gates	1 Thru 5	04/14/2021
329219 - Seeding	1 Thru 3	04/14/2021
329300 - Plants	1 Thru 5	04/14/2021

**DIVISION 33 -- UTILITIES**

330110.58 - Disinfection of Water Utility Piping Systems	1 Thru 3	04/14/2021
330561 - Concrete Manholes, Precast Utility Structures and Wastewater Catch Basins	1 Thru 3	04/14/2021
331416 - Site Water Utility Distribution Piping	1 Thru 3	04/14/2021
331636 - Prestressed Concrete Storage Tanks	1 Thru 13	04/14/2021
333113 - Site Sanitary Sewerage Gravity Piping	1 Thru 1	04/14/2021
333413 - Septic Tanks	1 Thru 1	04/14/2021
334100 – Subdrainage	1 Thru 1	04/14/2021
334211 - Stormwater Gravity Piping	1 Thru 3	04/14/2021
334213 - Stormwater Culverts	1 Thru 2	04/14/2021
334500 - Storm Water Treatment Device	1 Thru 3	04/14/2021

**DIVISION 41 -- MATERIAL PROCESSING AND HANDLING EQUIPMENT**

415219.01 - Tank Datasheets	1 Thru 22	04/14/2021
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**DIVISION 46 -- WATER AND WASTEWATER EQUIPMENT**

460106 - Operation and Maintenance Manual	1 Thru 7	04/14/2021
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460500 - Common Work Results for Water and Wastewater Equipment	1 Thru 12	04/14/2021
460506 - Water Treatment Piping	1 Thru 13	04/14/2021
460509 - Piping and Equipment Supports and Anchors	1 Thru 5	04/14/2021
460513 - Piping Specialties	1 Thru 6	04/14/2021
460517 - Sleeves and Sleeve Seals for Water and Wastewater Treatment Piping	1 Thru 3	04/14/2021
460525 - Water Treatment Pumps	1 Thru 12	04/14/2021
460913 - Control Gates	1 Thru 4	04/14/2021
460916 - Control Valves	1 Thru 10	04/14/2021
460923 - Monitoring and Control Instrumentation	1 Thru 10	04/14/2021
462156 – Intake Screens	1 Thru 4	04/14/2021
463129 - Chemical Metering and Transfer Pumps	1 Thru 7	04/14/2021
463300 - Liquid Chemical Feed Equipment	1 Thru 13	04/14/2021
464100 - Mixing Equipment	1 Thru 3	04/14/2021
466100 – Filtration Equipment	1 Thru 26	04/14/2021
466173 - Automatic Straining Equipment	1 Thru 5	04/14/2021

**EXHIBITS**

Exhibit A -- Pre-Purchased Equipment, Contract and Procurement Documents.	1 Thru 112	04/14/2021
Exhibit B -- Pre-Purchased Equipment, Technical Documents	Available Upon Request	04/14/2021

END OF SECTION

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**SECTION 000115 - INDEX OF DRAWINGS**

Sheet No.	Title	Revision Date
	GENERAL	
G1	COVER SHEET	04/14/2021
G2	INDEX	04/14/2021
G3	ABBREVIATIONS, SYMBOLS, AND LEGENDS	04/14/2021
G4	NOTES	04/14/2021
G5	BOUNDARY SITE SURVEY	04/14/2021
	CIVIL	
C1	PROCESS FLOW DIAGRAM	04/14/2021
C2	HYDRAULIC PROFILE	04/14/2021
C3-1	OVERALL EXISTING SITE PLAN	04/14/2021
C3-2	EXISTING BUFORD WATER WORKS SITE PLAN	04/14/2021
C3-3	EXISTING BUFORD RWPS & RAW WATER PIPE LINE SITE PLAN	04/14/2021
C4-1	OVERALL SITE LAYOUT PLAN	04/14/2021
C4-2	BUFORD WATER WORKS SITE LAYOUT PLAN	04/14/2021
C4-3	OVERALL ZONING AND TEMPORARY CONTRACTOR FACILITIES AREA	04/14/2021
C4-4	SITE GRADING PLAN	04/14/2021
C4-5	SITE YARD PIPING PLAN	04/14/2021
C4-6	SITE PIPING PROFILE, SHEET 1	04/14/2021
C4-7	SITE PIPING PROFILE, SHEET 2	04/14/2021
C4-8	SITE PIPING PROFILE, SHEET 3	04/14/2021
C5-1	CIVIL DETAILS, SHEET 1	04/14/2021
C5-2	CIVIL DETAILS, SHEET 2	04/14/2021
C5-3	CIVIL DETAILS, SHEET 3	04/14/2021
C5-4	CIVIL DETAILS, SHEET 4	04/14/2021
C5-5	CIVIL DETAILS, SHEET 5	04/14/2021
C5-6	CIVIL DETAILS, SHEET 6	04/14/2021
C5-7	CIVIL DETAILS, SHEET 7	04/14/2021
C6-1	STORMWATER PLAN	04/14/2021
C6-2	STORMWATER DETAILS, SHEET 1	04/14/2021
C6-3	STORMWATER DETAILS, SHEET 2	04/14/2021
C6-4	STORM WATER DETAILS, SHEET 3	04/14/2021
C6-5	STORM WATER DETAILS, SHEET 4	04/14/2021
C6-6	STORM WATER DETAILS, SHEET 5	04/14/2021
L1.0	PLANTING PLAN	04/14/2021
L2.0	LANDSCAPING DETAILS	04/14/2021
ES1	EROSION CONTROL NOTES, SHEET 1	04/14/2021
ES2	EROSION CONTROL NOTES, SHEET 2	04/14/2021
ES3	EROSION CONTROL NOTES, SHEET 3	04/14/2021
ES4	EROSION CONTROL NOTES, SHEET 4	04/14/2021
ES5	EROSION CONTROL DETAILS	04/14/2021
ES6	INITIAL EROSION CONTROL PLAN	04/14/2021
ES7	INTERMEDIATE EROSION CONTROL PLAN	04/14/2021
ES8	FINAL EROSION CONTROL PLAN	04/14/2021

D1	SITE DEMOLITION PLAN	04/14/2021
	MECHANICAL	
M1-1	PASSIVE INTAKE SCREEN STRUCTURE	04/14/2021
M1-2	PASSIVE INTAKE SCREEN STRUCTURE DETAILS	04/14/2021
M2-1	FLOWMETER VAULTS PLANS, SHEET 1	04/14/2021
M2-2	FLOWMETER VAULTS PLANS, SHEET 2	04/14/2021
M3-1	PROCESS LAYOUT PLAN, SHEET 1	04/14/2021
M3-2	PROCESS LAYOUT PLAN, SHEET 2	04/14/2021
M3-3	PROCESS LAYOUT PLAN, SHEET 3	04/14/2021
M3-4	PROCESS LAYOUT PLAN, SHEET 4	04/14/2021
M3-5	PROCESS LAYOUT SECTIONS, SHEET 1	04/14/2021
M3-6	PROCESS LAYOUT SECTIONS, SHEET 2	04/14/2021
M3-7	PROCESS LAYOUT SECTIONS, SHEET 3	04/14/2021
M3-8	PIPE GALLERY A	04/14/2021
M3-9	PIPE GALLERY B	04/14/2021
M3-10	PIPE GALLERY C	04/14/2021
M3-11	CHEMICAL OFFLOADING PLAN AND ELEVATION	04/14/2021
M3-12	PROCESS LAYOUT DETAILS, SHEET 1	04/14/2021
M3-13	PROCESS LAYOUT DETAILS, SHEET 2	04/14/2021
M3-14	PROCESS CHEMICAL DETAILS, SHEET 1	04/14/2021
M3-15	PROCESS CHEMICAL DETAILS, SHEET 2	04/14/2021
M3L-1	LABORATORY CABINET & EQUIPMENT	04/14/2021
M3L-2	LABORATORY CABINET & EQUIPMENT	04/14/2021
M4-1	CLEARWELL SHEET 1	04/14/2021
M4-2	CLEARWELL SHEET 2	04/14/2021
M4-3	CLEARWELL PRV VAULT	04/14/2021
M5-1	HIGH SERVICE PUMP STATION	04/14/2021
M5-2	HIGH SERVICE PUMP DETAILS	04/14/2021
M5-3	HIGH SERVICE PUMP STATION BUILDING DETAILS	04/14/2021
M6-1	HSP METER VAULT PLAN	04/14/2021
M6-2	HSP METER VAULT SECTIONS	04/14/2021
	ARCHITECTURAL	
A0.1	ARCHITECTURAL NOTES, CODES, STANDARDS	04/14/2021
A1.1	LEVEL 1 FLOOR PLAN AND NOTES	04/14/2021
A1.2	LEVEL 2 FLOOR PLAN AND NOTES	04/14/2021
A1.3	ROOF PLAN AND NOTES, DETAILS	04/14/2021
A1.4	ROOF DETAILS - STAIRS	04/14/2021
A1.5	LEVEL 2 REFLECTED CEILING PLAN	04/14/2021
A1.6	LEVEL 2 REFLECTED CEILING PLAN	04/14/2021
A1.7	FIRST AND SECOND FLOOR FINISH PLAN AND DETAILS	04/14/2021
A1.8	GENERIC FURNISHING PLAN, SCHEDULE AND NOTES	04/14/2021
A2.1	FRONT AND SIDE ELEVATION	04/14/2021
A2.2	REAR AND SIDE ELEVATION	04/14/2021
A2.3	DETAIL ELEVATIONS	04/14/2021
A2.4	BUILDING ELEVATIONS	04/14/2021
A3.1	BUILDING SECTIONS	04/14/2021
A3.2	EXTERIOR WALL SECTIONS, SHEET 1	04/14/2021
A3.3	EXTERIOR WALL SECTIONS, SHEET 2	04/14/2021
A3.4	EXTERIOR WALL DETAILS	04/14/2021
A3.5	WALL SECTIONS	04/14/2021
A3.6	CANOPY PLAN, SECTION AND DETAILS	04/14/2021

A4.1	INTERIOR WALL ELEVATIONS	04/14/2021
A5.1	PLAN AND ROOF DETAILS	04/14/2021
A5.2	EXTERIOR STAIRS AND DETAILS, SHEET 1	04/14/2021
A5.3	EXTERIOR STAIRS AND DETAILS, SHEET 2	04/14/2021
A6.1	DOOR SCHEDULE AND DETAILS	04/14/2021
A6.2	INTERIOR WINDOW PROFILES AND DETAILS	04/14/2021
	STRUCTURAL	
S0-1	GENERAL NOTES	04/14/2021
S0-2	GENERAL NOTES	04/14/2021
S0-3	COMPONENTS AND CLADDING	04/14/2021
S1-1	PIT FOUNDATION PLAN	04/14/2021
S1-2	FIRST FLOOR FOUNDATION PLAN	04/14/2021
S1-3	SECOND FLOOR FOUNDATION PLAN	04/14/2021
S1-4	ROOF FRAMING PLAN	04/14/2021
S1-5	HIGH SERVICE PUMP STATION PLANS	04/14/2021
S1-6	PASSIVE INTAKE SCREEN PLAN	04/14/2021
S1-7	SLAB ON GRADE SLOPE PLAN	04/14/2021
S1-8	GRATING PLANS	04/14/2021
S1-9	DUMPSTER PLANS AND DETAILS	04/14/2021
S3-1	FOUNDATION DETAILS	04/14/2021
S3-2	FOUNDATION DETAILS	04/14/2021
S3-3	FOUNDATION DETAILS	04/14/2021
S3-4	FOUNDATION DETAILS	04/14/2021
S3-5	FOUNDATION DETAILS	04/14/2021
S3-6	FOUNDATION DETAILS	04/14/2021
S3-7	FOUNDATION DETAILS	04/14/2021
S3-8	FOUNDATION DETAILS	04/14/2021
S4-1	MASONRY DETAILS	04/14/2021
S5-1	FRAMING DETAILS	04/14/2021
S5-2	FRAMING DETAILS	04/14/2021
S5-3	FRAMING DETAILS	04/14/2021
S5-4	FRAMING DETAILS	04/14/2021
S5-5	FRAMING DETAILS	04/14/2021
	FIRE PROTECTION	
FP001	FIRE PROTECTION NOTES	04/14/2021
FP101	FIRE PROTECTION SITE PLAN & DETAILS	04/14/2021
FP102	FIRE PROTECTION PLANS	04/14/2021
	HVAC	
H1	OVERALL PLAN, LEVEL ONE HVAC	04/14/2021
H2	OVERALL PLAN, LEVEL TWO HVAC	04/14/2021
H3	ROOF PLAN HVAC	04/14/2021
H4	ENLARGED BULK TANK AREA HVAC	04/14/2021
H5	ENLARGED OFFICE LEVEL ONE HVAC	04/14/2021
H6	ENLARGED OFFICE LEVEL TWO HVAC	04/14/2021
H7	HVAC SCHEDULES	04/14/2021
H8	HVAC NOTES	04/14/2021
H9	HVAC DETAILS	04/14/2021
H10	HVAC DETAILS & KITCHEN HOOD	04/14/2021
H11	HVAC SEISMIC DETAILS	04/14/2021
H12	HIGH SERVICE PUMP STATION HVAC	04/14/2021
	PLUMBING	

P1.1	LEVEL 1 WASTE AND VENT PLAN	04/14/2021
P2.1	LEVEL 2 WASTE AND VENT PLAN	04/14/2021
P3.1	LEVEL 1 DOMESTIC WATER PLAN	04/14/2021
P4.1	LEVEL 2 DOMESTIC WATER PLAN	04/14/2021
P5.1	PLUMBING RISER DIAGRAMS	04/14/2021
P6.1	NOTES, SCHEDULES, AND DETAILS	04/14/2021
P7.1	PLUMBING SEISMIC DETAILS	04/14/2021
	INSTRUMENTATION	
I0-1	P&ID LEGEND, SHEET 1	04/14/2021
I0-2	P&ID LEGEND, SHEET 2	04/14/2021
I1	P&ID, RAW WATER PUMP STATION	04/14/2021
I2	P&ID, PRESETTLING POND	04/14/2021
I3	P&ID, FEED PUMPS	04/14/2021
I4	P&ID, STRAINERS & STATIC MIXING	04/14/2021
I5	P&ID, CONTROL PANELS	04/14/2021
I6	P&ID, MEMBRANE SYSTEM	04/14/2021
I7	P&ID, BACKWASH	04/14/2021
I8	P&ID, DRAIN	04/14/2021
I9	P&ID, SODIUM HYPOCHLORITE	04/14/2021
I10	P&ID, HCL	04/14/2021
I11	P&ID, NAOH	04/14/2021
I12	P&ID, CITRIC ACID	04/14/2021
I13	P&ID, CIP	04/14/2021
I14	P&ID, CIP HEATHING, PH CHLORINE ANALYZER	04/14/2021
I15	P&ID, POST FILTRATION INJECTION	04/14/2021
I16	P&ID, SODIUM BISULFITE	04/14/2021
I17	P&ID, AQUAMAG	04/14/2021
I18	P&ID, FLUORIDE	04/14/2021
I19	P&ID, CLEARWELLS	04/14/2021
I20	P&ID, HIGH SERVICE PUMP STATION	04/14/2021
I21	P&ID, FLOWMETERS	04/14/2021
I22	P&ID, SLUDGE PONDS	04/14/2021
I23	P&ID, AIR SUPPLY	04/14/2021
I24	P&ID, FUTURE COAGULATION	04/14/2021
	ELECTRICAL	
E1-0	LEGEND, LIGHTING FIXTURE SCHEDULE AND KEY NOTES	04/14/2021
E1-1	MCC LAYOUT	04/14/2021
E1-2	POWER RISER DIAGRAM	04/14/2021
E1-3	ELECTRICAL SITE PLAN - POWER	04/14/2021
E1-4	ELECTRICAL SITE PLAN - CONTROLS	04/14/2021
E2-1	LEVEL ONE POWER PLAN, SHEET 1	04/14/2021
E2-2	LEVEL ONE POWER PLAN, SHEET 2	04/14/2021
E2-3	LEVEL ONE POWER PLAN, SHEET 3	04/14/2021
E2-4	UPPER LEVEL POWER PLAN	04/14/2021
E2-5	HIGH SERVICE PUMP STATION POWER PLAN	04/14/2021
E2-6	MECHANICAL ROOF POWER PLAN	04/14/2021
E3-1	LEVEL ONE LIGHTING PLAN	04/14/2021
E3-2	LEVEL TWO LIGHTING PLAN, SHEET 1	04/14/2021
E3-3	LEVEL TWO LIGHTING PLAN, SHEET 2	04/14/2021
E3-4	HIGH SERVICE PUMP STATION LIGHTING PLAN	04/14/2021
E4-1	LEVEL ONE MISCELLANEOUS SYSTEMS PLAN	04/14/2021



E4-2	LEVEL TWO MISCELLANEOUS SYSTEMS PLAN	04/14/2021
E4-3	ROOF PLAN MISCELLANEOUS SYSTEMS	04/14/2021
E5-1	LEVEL ONE CONTROLS PLAN, SHEET 1	04/14/2021
E5-2	LEVEL ONE CONTROLS PLAN, SHEET 2	04/14/2021
E5-3	LEVEL ONE CONTROLS PLAN, SHEET 3	04/14/2021
E5-4	LEVEL TWO CONTROLS PLAN	04/14/2021
E5-5	UPPER LEVEL CONTROLS PLAN	04/14/2021
E5-6	HIGH SERVICE PUMP STATION CONTROLS PLAN	04/14/2021
E6-1	ELECTRICAL ROOM ENLARGED PLAN	04/14/2021
E6-2	LIGHTING CONTROLS	04/14/2021
E7-1	ELECTRICAL DETAILS, SHEET 1	04/14/2021
E7-2	ELECTRICAL DETAILS, SHEET 2	04/14/2021
E7-3	ELECTRICAL DETAILS, SHEET 3	04/14/2021
	RAW WATER PUMP STATION	
RWC1	OVERALL SITE PIPING PLAN	04/14/2021
RWC2	RAW WATER LINE PLAN & PROFILE STA. 0+00 TO STA. 5+00	04/14/2021
RWC3	RAW WATER LINE PLAN & PROFILE STA. 5+00 TO STA. 9+00	04/14/2021
RWC4	RAW WATER LINE PLAN & PROFILE STA. 9+00 TO STA. 13+14	04/14/2021
RWES	EROSION CONTROL PLAN	04/14/2021
RWD1	DEMOLITION PLAN AT RAW WATER PUMP STATION	04/14/2021
RWD2	PUMP STATION AND RAW WATER INTAKE STRUCTURE PLANS DEMOLITION	04/14/2021
RWD3	PUMP STATION AND RAW WATER INTAKE STRUCTURE SECTIONS DEMOLITION	04/14/2021
RWM1-1	PUMP STATION AND RAW WATER INTAKE STRUCTURE PLANS	04/14/2021
RWM1-2	PUMP STATION AND RAW WATER INTAKE STRUCTURE SECTIONS	04/14/2021
RWS0	PUMP STATION AND RAW WATER INTAKE STRUCTURAL NOTES	04/14/2021
RWS1	PUMP STATION AND RAW WATER INTAKE STRUCTURAL PLAN & DETAILS	04/14/2021
RWS2	PUMP STATION AND RAW WATER INTAKE STRUCTURAL SECTIONS & DETAILS	04/14/2021
RWS3	PUMP STATION AND RAW WATER INTAKE STRUCTURAL SECTIONS & DETAILS	04/14/2021
RWE1	RWPS POWER RISER AND PANELBOARD SCHEDULES	04/14/2021
RWE2	RWPS ENLARGED SITE PLAN AND DETAILS	04/14/2021
RWE3	RWPS FLOOR PLAN - POWER, CONTROL, LIGHTING AND DETAILS	04/14/2021
RWE4	RWPS SITE PLAN AND DETAILS	04/14/2021
RWE5	FIBER OPTIC CABLE PARTIAL SITE PLAN AND DETAIL	04/14/2021

END OF SECTION

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**City of Buford**  
**2300 Buford Highway Buford, GA 30518**  
**Buford Water Works Replacement**

ADVERTISEMENT FOR BIDS

Sealed Bids for the construction of the Buford Water Works Replacement will be received, by The City of Buford, at the office of the City Manager, until 2:00 PM local time on Thursday, January 14th, at which time the Bids received will be publicly opened and read. The Project consists of renovating a raw water pump station and constructing a new raw water pipeline, screen structure, two clearwell structures, high service pump station, metering vaults, a process and administration building for membrane treatment, installation of all associated equipment, and all related yard piping, appurtenances, electrical, civil, and SCADA.

Bids will be received for a single prime Contract. Bids shall be on a lump sum and unit price basis, with additive alternate bid items as indicated in the Bid Form.

The Issuing Office for the Bidding Documents is: Keck & Wood, Inc., 3090 Premiere Parkway Suite 200, Duluth, GA 30097.

Bidding Documents also may be examined at City of Buford, 2300 Buford Highway Buford, GA 30518, on Mondays through Fridays between the hours of 9:00 am and 5:00 pm; and the office of the Engineer, Keck & Wood, Inc., 3090 Premiere Parkway Duluth, GA 30097 on Mondays through Fridays between the hours of 9:00 am and 5:00 pm.

Bidding Documents may be obtained from the Issuing Office during the hours indicated above. Bidding Documents are available on electronic media (as portable document format (PDF) files) for a non-refundable charge of \$25, including shipping via overnight express service. Alternatively, printed Bidding Documents may be obtained from the Issuing Office either via in-person pick-up or via mail, upon Issuing Office's receipt of payment for the Bidding Documents. The non-refundable cost of printed Bidding Documents is \$800 per set, payable to "Keck & Wood, Inc.", plus a non-refundable shipping charge. Upon Issuing Office's receipt of payment, printed Bidding Documents will be sent via the prospective Bidder's delivery method of choice; the shipping charge will depend on the shipping method chosen. The date that the Bidding Documents are transmitted by the Issuing Office will be considered the prospective Bidder's date of receipt of the Bidding Documents. Partial sets of Bidding Documents will not be available from the Issuing Office. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda if any, obtained from sources other than the Issuing Office.

A pre-bid conference will be held at 10:00 AM local time on Thursday, November 5th at the Buford Water Works, 3370 N Waterworks Road. Attendance at the pre-bid conference is mandatory and masks are required to be worn properly. A second pre-bid conference will be held at 10:00 AM local time on Thursday, December 17th at the Buford Water Works, 3370 N Waterworks Road. Attendance at the second pre-bid conference is mandatory for any bidders that did not attend the first pre-bid conference and masks are required to be worn properly. Attendance at the second pre-bid conference is not mandatory for those Bidders who attended the first pre-bid conference.

Bid security shall be furnished in accordance with the Instructions to Bidders.

Bid security shall be submitted with each bid in the amount of 5 percent of the total bid amount. No bid may be withdrawn for a period of 75 calendar days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

No proposal will be considered unless it is accompanied by satisfactory evidence that the Bidder holds either a Georgia State Contractor's License, Georgia State Utility Contractor's License, in compliance with Act. O.C.G.A. 43-14 and 43-41. Failure to provide the bidder's license or qualification number on the outside of the sealed proposal will result in rejection of the bid.

If the Contract is to be awarded, Owner will award the Contract on the basis of the base bid or the base bid plus selected alternatives as best suits the interest of the Owner.

Owner: **City of Buford**

By: **Bryan Kerlin**

Title: **City Manager**

Date: **October 22, 2020**

**INSTRUCTIONS TO BIDDERS**

**TABLE OF CONTENTS**

	Page
Article 1 – Defined Terms	2
Article 2 – Copies of Bidding Documents	2
Article 3 – Qualifications of Bidders	2
Article 4 – Site and Other Areas; Existing Site Conditions; Examination of Site; Owner’s Safety Program; Other Work at the Site	2
Article 5 – Bidder’s Representations	4
Article 6 – Pre-Bid Conference	5
Article 7 – Interpretations and Addenda	5
Article 8 – Bid Security	5
Article 9 – Contract Times	5
Article 10 – Liquidated Damages	5
Article 11 – Substitute and “Or-Equal” Items	5
Article 12 – Subcontractors, Suppliers, and Others	6
Article 13 – Preparation of Bid	6
Article 14 – Basis of Bid	7
Article 15 – Submittal of Bid	8
Article 16 – Modification and Withdrawal of Bid	8
Article 17 – Opening of Bids	8
Article 18 – Bids to Remain Subject to Acceptance	8
Article 19 – Evaluation of Bids and Award of Contract	8
Article 20 – Bonds and Insurance	9
Article 21 – Signing of Agreement	9
Article 22 - Procurement Contract to be Assigned	9

**ARTICLE 1 - DEFINED TERMS**

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued.

**ARTICLE 2 - COPIES OF BIDDING DOCUMENTS**

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

**ARTICLE 3 - QUALIFICATIONS OF BIDDERS**

- 3.01 Bidder's submitting Bids on the project shall comply with the following minimum qualification requirements at the time of receiving Bids:
- A. Bidder hold the proper licensure shall be licensed to perform this work in the state of Georgia
- B. Contractor providing work on all storm drainage and all water system components must hold a utility contractor license in accordance with O.C.G.A. 43-14.
- C. Contractor providing work on all other project components must hold a general contractor license in accordance with O.C.G.A. 43-41.
- D. Bidder submits on the outside of the bid submittal envelope and on the bid form the contractor's license number
- 3.02 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within five days of Owner's request, Bidder shall submit (a) written evidence establishing its qualifications such as financial data, previous **experience**, and present commitments, and (b) the following additional information:
- A. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others."
- B. Other required information regarding qualifications
- 3.03 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.05 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

**ARTICLE 4 - SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE**

- 4.01 *Site and Other Areas*
- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.
- 4.02 *Existing Site Conditions*
- A. Subsurface and Physical Conditions
1. The Supplementary Conditions identify:

- a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
      - b. Technical Data contained in such reports and drawings.
    - 2. Engineer will make copies of reports and drawings referenced above available to any Bidder on request. Electronic pdf copies of the subsurface conditions report and drawings of the existing conditions and physical conditions are without charge upon request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
    - 3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
  - B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
  - C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions.
- 4.03 *Site Visit and Testing by Bidders*
- A. Bidder shall conduct Site visit during normal working hours, and shall not disturb any ongoing operations at the Site. Site visits are to be scheduled through Cory Burge, City of Buford, at (770) 945-6761 and shall be scheduled at least 48 hours prior to desired time. Site visits will not take place within 48 hours prior to bid submittal due date.
  - B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
  - C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
  - D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
  - E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.
- 4.04 *Owner's Safety Program*
- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.
- 4.05 *Other Work at the Site*
- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

**ARTICLE 5 - BIDDER'S REPRESENTATIONS**

- 5.01 It is the responsibility of each Bidder before submitting a Bid to:
- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
  - B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
  - C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
  - D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
  - E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;
  - F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
  - G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
  - H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
  - I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
  - J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.



**ARTICLE 6 - PRE-BID CONFERENCE**

6.01 A pre-Bid conference will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the mandatory conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

**ARTICLE 7 - INTERPRETATIONS AND ADDENDA**

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Questions by email should be sent to [bidquestions@keckwood.com](mailto:bidquestions@keckwood.com) and should include company name, contact name, email address, and phone number with a subject stating "Buford Water Works Replacement".

7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

**ARTICLE 8 - BID SECURITY**

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.

8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 76 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

**ARTICLE 9 - CONTRACT TIMES**

9.01 The number of days within which, or the dates by which, Milestones are to be achieved and the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

**ARTICLE 10 - LIQUIDATED DAMAGES**

10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

**ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS**

- 11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or “or-equal” items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or “or-equal” item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

## **ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS**

- 12.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.
- 12.03 The apparent Successful Bidder, and any other Bidder so requested, shall after submitting its Bid and within five days of Owner’s request, submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work: demolition contractor, grading contractor, concrete contractor, utility contractor, electrical contractor. If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

## **ARTICLE 13 - PREPARATION OF BID**

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”

- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.
- 13.03 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.04 A Bid by an individual shall show the Bidder's name and official address.
- 13.05 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.06 All names shall be printed in ink below the signatures.
- 13.07 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.09 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

#### **ARTICLE 14 - BASIS OF BID**

- 14.01 Base Bid with Alternates
- A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents and as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.
  - B. In the comparison of Bids, alternates will be applied in any order as best suits the interest of the Owner.
- 14.02 Unit Price
- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
  - B. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
  - C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- 14.03 Allowances
- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

**ARTICLE 15 - SUBMITTAL OF BID**

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to: ATTN: Bryan Kerlin, City Manager, City of Buford, 2300 Buford Highway, Buford, GA 30518.
- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

**ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID**

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 48 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

**ARTICLE 17 - OPENING OF BIDS**

- 17.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly.

**ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

**ARTICLE 19 - EVALUATION OF BIDS AND AWARD OF CONTRACT**

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 19.03 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be

requested in the Bid Form or prior to the Notice of Award.

- B. In the comparison of Bids, alternates will be applied in any order as best suits the interest of the Owner. For comparison purposes alternates will be accepted in any order and combination as best suits the interest of the Owner. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.
- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

## **ARTICLE 20 - BONDS AND INSURANCE**

- 20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

## **ARTICLE 21 - SIGNING OF AGREEMENT**

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

## **ARTICLE 22 - PROCUREMENT CONTRACT TO BE ASSIGNED**

- 22.01 Bidder's attention is directed to the provisions of Article 11 of the Procurement Agreement which provide for the assignment of the Procurement Contract to a construction contractor designated by the Buyer to construct Water Plant Membrane Filtration System. Successful Bidder (Seller) will be required to perform the Procurement Contract after it has been assigned to the construction contractor (Contractor Assignee) in accordance with the provisions in the Procurement Contract. Timing of the assignment is addressed in the Procurement Agreement. Forms documenting the assignment of the Procurement Contract and for the agreement of the Seller's surety to such assignment are included as attachments to the Procurement Agreement.

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**SECTION 004100 - BID FORM**

**Buford Water Works Replacement**

**Buford, Georgia**

PROJECT NO. 170110

**TABLE OF CONTENTS**

	<b>PAGE</b>
ARTICLE 1 - BID RECIPIENT .....	2
ARTICLE 2 - BIDDER'S ACKNOWLEDGMENTS .....	2
ARTICLE 3 - BIDDER'S REPRESENTATION.....	2
ARTICLE 4 - BIDDER'S CERTIFICATION .....	3
ARTICLE 5 - BASIS OF BID .....	4
ARTICLE 6 - TIME OF COMPLETION .....	7
ARTICLE 7 - ATTACHMENTS TO THIS BID .....	7
ARTICLE 8 -DEFINED TERMS .....	7
ARTICLE 9 - BID SUBMITTAL.....	8

**ARTICLE 1 - BID RECIPIENT**

1.1 This bid is submitted to:

**CITY OF BUFORD  
2300 BUFORD HIGHWAY  
BUFORD, GA 30518**

1.2 The undersigned bidder proposes and agrees, if this bid is accepted, to enter into an agreement with owner in the form included in the bidding documents to perform all work as specified or indicated in the bidding documents for the prices and within the times indicated in this bid and in accordance with the other terms and conditions of the bidding documents.

**ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS**

- 2.1 Bidder accepts all of the terms and conditions of the instructions to bidders, including without limitation those dealing with the disposition of bid security. This bid will remain subject to acceptance for 75 days after the bid opening, or for such longer period of time that bidder may agree to in writing upon request of owner.
- 2.2 Bidder acknowledges the provisions of the Agreement as to the assignment of the specified contract for procurement of goods and special services for the Water Plant Membrane Filtration System.

**ARTICLE 3 - BIDDER'S REPRESENTATIONS**

3.1 In submitting this bid, bidder represents that:

- A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that



have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

#### **ARTICLE 4 - BIDDER'S CERTIFICATION**

##### 4.1 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
  - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

**ARTICLE 5 - BASIS OF BID**

5.1 BIDDER WILL COMPLETE THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS FOR THE FOLLOWING PRICE(S):

- A. BUFORD WATER WORKS REPLACEMENT: (including the Base Bid Major Equipment listed under B. of this BID FORM, lowest price)

**LUMP SUM BID PRICE** \$ \_\_\_\_\_

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	BID UNIT PRICE	BID PRICE
<b>ALLOWANCES:</b>					
1.	CAST METAL PLAQUE	LS	1	\$4,000.00	\$4,000.00
2.	ROCK EXCAVATION, REMOVAL, & REPLACEMENT WITH SATISFACTORY SOIL MATERIALS	CY	350	N.A.	N.A.
3.	INSPECTION AND TESTING	LS	1	\$150,000.00	\$150,000.00
4.	FURNISHINGS AND FIXTURES	LS	1	\$15,000.00	\$15,000.00
5.	MEMBRANE FILTRATION SYSTEM PROCUREMENT CONTRACT REMAINING BALANCE	LS	1	\$881,874.01	\$881,874.01
6.	SECURITY, TV MONITORS, AV SYSTEMS, AND APPLIANCES	LS	1	\$50,000.00	\$50,000.00
7.	CONTINGENCY	LS	1	\$100,000.00	\$100,000.00
8.	STABILIZATION STONE	CY	300	N.A.	N.A.

All specified cash allowances are included in the price(s) set forth above, and have been computed in accordance with paragraph 13.02 of the general conditions.

**TOTAL OF LUMP SUM PLUS ALLOWANCES = BASE BID PRICE:**

\_\_\_\_\_ DOLLARS  
(Written Sum)

\$ \_\_\_\_\_  
(Numeric Sum)

B. **MAJOR EQUIPMENT:** For furnishings and installing the following major items of equipment as shown on the Drawings and as specified. The Bidder is required to submit bid price changes for minimum of two manufacturers of equipment which are listed below and meet or exceed the Specifications herein. Bidder shall indicate Model of equipment where it appears blank on the form. Any makes of equipment that the Bidder may wish to propose and meet or exceed the Specifications herein by using the blank space for manufacturers not providing Bid Price. Use the lowest price of a Listed Manufacturer, not "Or Equal", for the base bid. (See Instruction for Bidders for determinations of the lowest acceptable bid.)

1. Section 460525 - Water Treatment Pumps

a. Membrane Feed Pumps

Manufacturer	Model	Bid Price
Peerless	6AE16N-Vert	\$
Grundfos	5012/7/8 KPVS	\$
"Or Equal" (Name Manufacturer, model, and price on line below)		
		\$
(manufacturer)	(model)	(bid price)

b. Raw Water Transfer Pumps

Manufacturer	Model	Bid Price
Peerless	14MD/LC	\$
National Pump Company	H14LC	\$
Goulds Pumps, Inc.	-	\$
"Or Equal" (Name Manufacturer, model, and price on line below)		
		\$
(manufacturer)	(model)	(bid price)

c. High Service Pumps

Manufacturer	Model	Bid Price
Peerless	14MC/LC	\$
National Pump Company	H14LC	\$
Goulds Pumps, Inc.	VIT-DIFM 16BLC	\$
"Or Equal" (Name Manufacturer, model, and price on line below)		
		\$
(manufacturer)	(model)	(bid price)

2. Section 466173 - Automatic Straining Equipment

Manufacturer	Model	Bid Price
Fluid Engineering, Inc.	-	\$
Amiad Corporation	EBS-15000	\$
Eaton Corporation	2596	\$
ACME Engineering Products, Inc.	ACRS-OF-08-150	\$
"Or Equal" (Name Manufacturer, model, and price on line below)		
		\$
(manufacturer)	(model)	(bid price)

3. Section 463129 - Chemical Metering and Transfer Pumps

a. Chemical Feed Pumps

<b>Manufacturer</b>	<b>Bid Price</b>
Watson-Marlow/Bredel Pumps	\$
Verdeflex Pumps	\$
ProMinent Pumps	\$
Blue-White Industries	\$
Cole Palmer	\$
"Or Equal" (Name Manufacturer, model, and price on line below)	
	\$
(manufacturer)	(bid price)

b. Bulk Transfer Pumps

<b>Manufacturer</b>	<b>Bid Price</b>
Watson-Marlow/Bredel Pumps	\$
Verdeflex Pumps	\$
ProMinent Pumps	\$
Blue-White Industries	\$
Cole Palmer	\$
"Or Equal" (Name Manufacturer, model, and price on line below)	
	\$
(manufacturer)	(bid price)

4. Section 331636 - Prestressed Concrete Storage Tanks

<b>Manufacturer</b>	<b>Bid Price</b>
Crom Corporation	\$
Precon Corporation	\$
Preload LLC	\$
"Or Equal" (Name Manufacturer and price on line below)	
(manufacturer)	(bid price)

- C. ALTERNATES: For furnishing and installing of those items in the Contract Documents which are listed in Section 012300 - Alternates

Alternate No.	Add/Deduct	Description	Unit	Bid Price
Alternate No. 1	Add	Clearwell No. 2	LS	\$
Alternate No. 2	Deduct	Bridge Crane Beam and Column Support Material of Construction	LS	\$

**TOTAL OF BASE BID AND ALL ALTERNATES BID PRICE:**

\_\_\_\_\_ DOLLARS  
(Written Sum)

\$ \_\_\_\_\_  
(Numeric Sum)

**ADJUSTMENT UNIT PRICE BID SCHEDULE**

Item No.	Description	Unit	Bid Adjustment Unit Price
A2	Rock Excavation & Removal For Allowance No. 2	Per Cubic Yard	
A8	Stabilization Stone For Allowance No. 8	Per Cubic Yard	

Bidder acknowledges that (1) each Bid Adjustment Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and (2) each Bid Adjustment Unit Price will be used to compute authorized increases and decreases in the Contract Price based on actual quantities, determined as provided in the Contract Documents.

**ARTICLE 6 - TIME OF COMPLETION**

6.1 TIME OF COMPLETION

- A. Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.2 BIDDER ACCEPTS THE PROVISIONS OF THE AGREEMENT AS TO LIQUIDATED DAMAGES.

**ARTICLE 7 - ATTACHMENTS TO THIS BID**

7.1 THE FOLLOWING DOCUMENTS ARE SUBMITTED WITH AND MADE A CONDITION OF THIS BID:

- A. Required Bid security;
- B. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

- C. Contractor's License No.: \_\_\_\_\_ [or] Evidence of Bidder's ability to obtain a State Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids;
- D. Affidavits of Non-Collusion and O.C.G.A. 13-10-91(b)(1) federal work authorization program.

**ARTICLE 8 - DEFINED TERMS**

- 8.1 THE TERMS USED IN THIS BID WITH INITIAL CAPITAL LETTERS HAVE THE MEANINGS STATED IN THE INSTRUCTIONS TO BIDDERS, THE GENERAL CONDITIONS, AND THE SUPPLEMENTARY CONDITIONS.

**ARTICLE 9 - BID SUBMITTAL**

BIDDER: *(INDICATE CORRECT NAME OF BIDDING ENTITY ON LINE BELOW)*

\_\_\_\_\_

BY:

SIGNATURE : \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

*(IF BIDDER IS A CORPORATION, A LIMITED LIABILITY COMPANY, A PARTNERSHIP, OR A JOINT VENTURE, ATTACH EVIDENCE OF AUTHORITY TO SIGN)*

SUBMITTAL DATE: \_\_\_\_\_

ADDRESS FOR GIVING NOTICES:

\_\_\_\_\_

\_\_\_\_\_

TELEPHONE NUMBER: \_\_\_\_\_

FAX NUMBER: \_\_\_\_\_

CONTACT NAME AND E-MAIL ADDRESS: \_\_\_\_\_

BIDDER'S LICENSE NO. OR

PREQUALIFICATINO NO.: \_\_\_\_\_

*(WHERE APPLICABLE)*

**Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)**

BY EXECUTING THIS AFFIDAVIT, THE UNDERSIGNED CONTRACTOR VERIFIES ITS COMPLIANCE WITH O.C.G.A. § 13-10-91, STATING AFFIRMATIVELY THAT THE INDIVIDUAL, FIRM OR CORPORATION WHICH IS ENGAGED IN THE PHYSICAL PERFORMANCE OF SERVICES ON BEHALF OF \_\_\_\_\_ (NAME OF PUBLIC EMPLOYER) HAS REGISTERED WITH, IS AUTHORIZED TO USE AND USES THE FEDERAL WORK AUTHORIZATION PROGRAM COMMONLY KNOWN AS E-VERIFY, OR ANY SUBSEQUENT REPLACEMENT PROGRAM, IN ACCORDANCE WITH THE APPLICABLE PROVISIONS AND DEADLINES ESTABLISHED IN O.C.G.A. § 13-10-91. FURTHERMORE, THE UNDERSIGNED CONTRACTOR WILL CONTINUE TO USE THE FEDERAL WORK AUTHORIZATION PROGRAM THROUGHOUT THE CONTRACT PERIOD AND THE UNDERSIGNED CONTRACTOR WILL CONTRACT FOR THE PHYSICAL PERFORMANCE OF SERVICES IN SATISFACTION OF SUCH CONTRACT ONLY WITH SUBCONTRACTORS WHO PRESENT AN AFFIDAVIT TO THE CONTRACTOR WITH THE INFORMATION REQUIRED BY O.C.G.A. § 13-10-91(B). CONTRACTOR HEREBY ATTESTS THAT ITS FEDERAL WORK AUTHORIZATION USER IDENTIFICATION NUMBER AND DATE OF AUTHORIZATION ARE AS FOLLOWS:

\_\_\_\_\_  
FEDERAL WORK AUTHORIZATION USER IDENTIFICATION NUMBER

\_\_\_\_\_  
DATE OF AUTHORIZATION

\_\_\_\_\_  
NAME OF CONTRACTOR

\_\_\_\_\_  
NAME OF PUBLIC EMPLOYER

I HEREBY DECLARE UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT AND THAT THIS AFFIDAVIT WAS EXECUTED IN \_\_\_\_\_,  
\_\_\_\_\_ THIS \_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_.

*City*

*State*

\_\_\_\_\_  
SIGNATURE OF AUTHORIZED OFFICER OR AGENT

\_\_\_\_\_  
PRINTED NAME / TITLE OF AUTHORIZED OFFICER OR AGENT

SWORN TO AND SUBSCRIBED BEFORE ME THIS  
\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
NOTARY PUBLIC  
MY COMMISSION EXPIRES:



**Systematic Alien Verification for Entitlements (SAVE) Program**

**O.C.G.A. § 50-36-1(E)(2) AFFIDAVIT**

BY EXECUTING THIS AFFIDAVIT UNDER OATH, AS AN APPLICANT FOR A SUPPLIER OF GOODS/SERVICES, AS REFERENCED IN O.C.G.A. § 50-36-1, FROM \_\_\_\_\_ (NAME OF GOVERNMENT ENTITY), THE UNDERSIGNED APPLICANT VERIFIES ONE OF THE FOLLOWING WITH RESPECT TO MY APPLICATION FOR A PUBLIC BENEFIT:

1. \_\_\_\_\_ I am a United States citizen.
2. \_\_\_\_\_ I am a legal permanent resident of the United States.
3. \_\_\_\_\_ I am a qualified alien or non-immigrant under the Federal Immigration and Nationality Act and lawfully present in the United States with an alien number issued by the Department of Homeland Security or other federal immigration agency.

My alien number issued by the Department of Homeland Security or other federal immigration agency is: \_\_\_\_\_.

THE UNDERSIGNED APPLICANT ALSO HEREBY VERIFIES THAT HE OR SHE IS 18 YEARS OF AGE OR OLDER AND HAS PROVIDED AT LEAST ONE SECURE AND VERIFIABLE DOCUMENT, AS REQUIRED BY O.C.G.A. § 50-36-1(E)(1), WITH THIS AFFIDAVIT.

THE SECURE AND VERIFIABLE DOCUMENT PROVIDED WITH THIS AFFIDAVIT CAN BEST BE CLASSIFIED AS:

\_\_\_\_\_  
IN MAKING THE ABOVE REPRESENTATION UNDER OATH, I UNDERSTAND THAT ANY PERSON WHO KNOWINGLY AND WILLFULLY MAKES A FALSE, FICTITIOUS, OR FRAUDULENT STATEMENT OR REPRESENTATION IN AN AFFIDAVIT SHALL BE GUILTY OF A VIOLATION OF O.C.G.A. § 16-10-20, AND FACE CRIMINAL PENALTIES AS ALLOWED BY SUCH CRIMINAL STATUTE.

EXECUTED IN \_\_\_\_\_ (CITY), \_\_\_\_\_ (STATE).

\_\_\_\_\_  
SIGNATURE OF APPLICANT

\_\_\_\_\_  
PRINTED NAME/TITLE OF APPLICANT

SWORN TO AND SUBSCRIBED BEFORE ME

THIS \_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
NOTARY PUBLIC

MY COMMISSION EXPIRES:

NONCOLLUSION AFFIDAVIT OF PRIME BIDDER

State of \_\_\_\_\_.

County of \_\_\_\_\_

\_\_\_\_\_, being first duly sworn, deposes and says that:

(1) He is \_\_\_\_\_ of \_\_\_\_\_, the

Title

Contractors Name

Bidder that has submitted the attached Bid;

(2) He is fully informed repeating the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

(3) Such Bid is genuine and is not a collusive or sham Bid;

(4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the \_\_\_\_\_ or any persons interested in the proposed Contract; and (Legal Public Agency)

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any agents, representatives, owners, employees, or parties in interest, including this affiant.

(Signed) \_\_\_\_\_

\_\_\_\_\_

Title

Subscribed and sworn to before me

this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Title

My commission expires: \_\_\_\_\_

**BID BOND**

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

\_\_\_\_\_  
BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

City of Buford  
2300 Buford Highway  
Buford, GA 30518  
BID

Bid Due Date:

Description (*Project Name - Include Location*): Buford Water Works Replacement  
3370 North Waterworks Road Buford Georgia 30518

BOND

Bond Number:

Date:

Penal sum \_\_\_\_\_ \$ \_\_\_\_\_  
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

**BIDDER**

**SURETY**

\_\_\_\_\_(Seal) \_\_\_\_\_(Seal)  
Bidder's Name and Corporate Seal Surety's Name and Corporate Seal

By: \_\_\_\_\_ By: \_\_\_\_\_  
Signature Signature (Attach Power of Attorney)  
\_\_\_\_\_  
Print Name Print Name  
\_\_\_\_\_  
Title Title

Attest: \_\_\_\_\_ Attest: \_\_\_\_\_  
Signature Signature  
\_\_\_\_\_  
Title Title

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
  - 3.2 All Bids are rejected by Owner, or
  - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

**NOTICE OF AWARD**

Date of Issuance:

Owner: City of Buford

Engineer: Keck & Wood, Inc.

Project:

Bidder:

Bidder's Address:

Owner's Contract No.:

Engineer's Project No.:

Contract Name:

**TO BIDDER:**

You are notified that Owner has accepted your Bid dated \_\_\_\_\_ or the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

The Contract Price of the awarded Contract is: \$ \_\_\_\_\_

unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically.

a set of the Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner \_\_\_\_ counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security [e.g., performance and payment [bonds] and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

\_\_\_\_\_  
Owner:

\_\_\_\_\_  
Authorized Signature

By:

Title:

Copy: Engineer

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**AGREEMENT  
BETWEEN OWNER AND CONTRACTOR  
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)**

THIS AGREEMENT is by and between City of Buford ("Owner") and

---

("Contractor").

Owner and Contractor hereby agree as follows:

**ARTICLE 1 - WORK**

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Buford Water Works Replacement

**ARTICLE 2 - THE PROJECT**

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows:

The Project consists of renovating a raw water pump station and constructing a new raw water pipeline, screen structure, two clearwell structures, high service pump station, metering vaults, a process and administration building for membrane treatment, installation of all associated equipment, and all related yard piping, appurtenances, electrical, civil, and SCADA.

**ARTICLE 3 - ENGINEER**

3.01 The Project has been designed by Keck & Wood, Inc.

3.02 The Owner has retained Keck & Wood, Inc. ("Engineer") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

**ARTICLE 4 - CONTRACT TIMES**

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Contract Times: Days*

A. The Work will be substantially completed within 640 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 670 days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner \$500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$250 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

**ARTICLE 5 - CONTRACT PRICE**

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

**ARTICLE 6 - PAYMENT PROCEDURES**

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 25th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
  1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
    - a. 90 percent of Work completed (with the balance being retainage).
    - b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
  - B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

**ARTICLE 7 - INTEREST**

7.01 All amounts not paid when due shall bear interest at the state law maximum per annum.

**ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS**

8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:

- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.



- B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
- F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

## **ARTICLE 9 - CONTRACT DOCUMENTS**

### **9.01 Contents**

- A. The Contract Documents consist of the following:
  - 1. This Agreement (pages 1 to \_\_, inclusive).
  - 2. Performance bond (pages 1 to \_\_, inclusive).
  - 3. Payment bond (pages 1 to \_\_, inclusive).
  - 4. General Conditions (pages 1 to \_\_, inclusive).
  - 5. Supplementary Conditions (pages 1 to \_\_, inclusive).
  - 6. Specifications as listed in the Table of Contents of the Project Manual.
  - 7. Exhibit A (pages 1 to \_\_, inclusive).
  - 8. Exhibit B (pages 1 to \_\_, inclusive).
  - 9. Drawings (not attached but incorporated by reference) consisting of the Drawings listed on the attached Sheet Index.
  - 10. Addenda (numbers \_\_\_ to \_\_\_\_, inclusive).
  - 11. Exhibits to this Agreement (enumerated as follows):
    - a. Contractor's Bid (pages \_\_\_ to \_\_\_\_, inclusive).
  - 12. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    - a. Notice to Proceed.

- b. Work Change Directives.
  - c. Change Orders
  - d. Field Orders.
- B. There are no Contract Documents other than those listed above in this Article 9.
- C. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

**ARTICLE 10 - MISCELLANEOUS**

10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
  2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
  4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

10.06 *Procurement Contract To Be Assigned*

- A. The contract between Owner as "Buyer" and Zenon Environmental Corporation as "Seller" for procurement of goods and special services ("Procurement Contract") for Water Plant

Membrane Filtration System is hereby assigned to Contractor by Owner, and Contractor accepts such assignment. A form documenting the assignment is attached as an exhibit to the Agreement.

- B. This assignment will occur on the Effective Date of the Agreement and will relieve Owner as Buyer from all further obligations and liabilities under the Procurement Contract. Contractor, as Buyer (Contractor/Assignee) following assignment, will assume full responsibility to Owner for the performance of obligations by Seller, which will be Contractor's Subcontractor or Supplier. Notwithstanding this assignment, all performance guarantees and warranties required by the Procurement Contract will continue to run for the benefit of the Owner and, in addition, for the benefit of the Contractor. Except as noted in the Procurement Contract, all rights, duties, and obligations of Engineer to Buyer and Seller under the Procurement Contract will cease upon assignment.
- C. A copy of the assigned Procurement Contract is attached.

#### 10.07 *Other Provisions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on \_\_\_\_\_ (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

*(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest: \_\_\_\_\_

Attest: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Address for giving notices:

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**CERTIFICATE OF OWNER'S ATTORNEY**

I, the undersigned, \_\_\_\_\_, the duly authorized and acting legal representative of \_\_\_\_\_, do hereby certify as follows:

I have examined the attached Contract(s) and performance and payment bond(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

\_\_\_\_\_

Date: \_\_\_\_\_

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**NOTICE TO PROCEED**

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Owner: City of Buford	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: Keck & Wood, Inc.	Engineer's Project No.:
Project:	Contract Name:
	Effective Date of Contract:

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TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on \_\_\_\_\_, 20\_\_.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, the number of days to achieve Substantial Completion is \_\_\_\_\_, and the number of days to achieve readiness for final payment is \_\_\_\_\_.

Date of Substantial Completion: \_\_\_\_\_.

Date to achieve Readiness for Final Payment: \_\_\_\_\_.

Before starting any Work at the Site, Contractor must comply with the following:

Contractor shall secure the site when not present.

Contractor shall follow safety precautions identified in Preconstruction Conference with respect to COVID-19.

Contractor to obtain and submit to Engineer all required licenses.

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Owner:

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(Authorized Signature)

By:

Title:

Date Issued:

Copy: Engineer

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**PERFORMANCE BOND**

CONTRACTOR (Name and Address):

SURETY (Name and Address):

OWNER (Name and Address):

**City of Buford  
2300 Buford Highway  
Buford, GA 30518**

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description (name and location): **Buford Water Works Replacement , Buford, Georgia**

BOND

Bond Number:

Amount:

Description (name and location):

Modifications to the Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

<b>CONTRACTOR AS PRINCIPAL</b>	<b>SURETY</b>
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____ Signature	By: _____ Signature (attach power of attorney)
Print Name	Print Name
Title	Title
Attest: _____ Signature	Attest: _____ Signature
Title	Title

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:
  - 3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
  - 3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
  - 3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
  - 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
  - 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
  - 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
  - 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
    - 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
    - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
  - 7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
  - 7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
  - 7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
14. Definitions
  - 14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
  - 14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

- 14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
- 14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
16. Modifications to this Bond are as follows:

**PAYMENT BOND**

CONTRACTOR *(name and address)*: SURTEY: *(name and address of principal place of business)*

OWNER *(name and address)*:

**City of Buford**

**CONSTRUCTION CONTRACT**

Effective Date of the Agreement:

Amount:

Description *(name and location)*: **Buford Water Works Replacement, Buford, Georgia**

**BOND**

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form:           None           See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

**CONTRACTOR AS PRINCIPAL**

\_\_\_\_\_ *(seal)*

Contractor's Name and Corporate Seal

By: \_\_\_\_\_

Signature

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

Attest: \_\_\_\_\_

Signature

\_\_\_\_\_  
Title

**SURETY**

\_\_\_\_\_ *(seal)*

Surety's Name and Corporate Seal

By: \_\_\_\_\_

Signature *(attached power of attorney)*

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

Attest: \_\_\_\_\_

Signature

\_\_\_\_\_  
Title

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
  - 5.1 Claimants who do not have a direct contract with the Contractor,
    - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
    - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
  - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
  - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
  - 7.2 Pay or arrange for payment of any undisputed amounts.
  - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. Definitions
  - 16.1 Claim: A written statement by the Claimant including at a minimum:
    - 16.1.1 The name of the Claimant;
    - 16.1.2 The name of the person for whom the labor was done, or materials or equipment furnished;
    - 16.1.3 A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
    - 16.1.4 A brief description of the labor, materials, or equipment furnished;
    - 16.1.5 The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
    - 16.1.6 The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
    - 16.1.7 The total amount of previous payments received by the Claimant; and
    - 16.1.8 The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

- 16.2 Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
  - 16.3 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
  - 16.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
  - 16.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
18. Modifications to this Bond are as follows:



**Contractor's Application for Payment No.**

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

**Application For Payment  
Change Order Summary**

Approved Change Orders	Number	Additions	Deductions		
				<b>1. ORIGINAL CONTRACT PRICE</b> .....	\$ _____
				<b>2. Net change by Change Orders</b> .....	\$ _____
				<b>3. Current Contract Price (Line 1 ± 2)</b> .....	\$ _____
				<b>4. TOTAL COMPLETED AND STORED TO DATE</b> (Column F total on Progress Estimates).....	\$ _____
				<b>5. RETAINAGE:</b>	
				a. X _____ <b>Work Completed</b> .....	\$ _____
				b. X _____ <b>Stored Material</b> .....	\$ _____
				c. <b>Total Retainage (Line 5.a + Line 5.b)</b> .....	\$ _____
				<b>6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)</b> .....	\$ _____
				<b>7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)</b> .....	\$ _____
				<b>8. AMOUNT DUE THIS APPLICATION</b> .....	\$ _____
				<b>9. BALANCE TO FINISH, PLUS RETAINAGE</b> (Column G total on Progress Estimates + Line 5.c above).....	\$ _____
<b>TOTALS</b>					
	NET CHANGE BY CHANGE ORDERS				

**Contractor's Certification**

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

---

**Contractor Signature**

By:	Date:
-----	-------

Payment of: \$ \_\_\_\_\_  
(Line 8 or other - attach explanation of the other amount)

is recommended by: \_\_\_\_\_ (Date)  
(Engineer)

Payment of: \$ \_\_\_\_\_  
(Line 8 or other - attach explanation of the other amount)

is approved by: \_\_\_\_\_ (Date)  
(Owner)

Approved by: \_\_\_\_\_ (Date)  
Funding or Financing Entity (if applicable)



### Progress Estimate - Unit Price Work

### Contractor's Application

For (Contract):						Application Number:					
Application Period:						Application Date:					
Item		Contract Information			B	C	D	E	F		
Bid Item No.	Description	Item Quantity	Units	Unit Price	Total Value of Item (\$)	Estimated Quantity Installed	Value of Work Installed to Date	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F / B)	Balance to Finish (B - F)
					<b>Totals</b>						

**Stored Material Summary**

**Contractor's Application**

A		B	C	D		E	F	G				
Bid Item No.	Supplier Invoice No.			Storage Location	Description of Materials or Equipment Stored				Stored Previously		Subtotal Amount Completed and Stored to Date (D + E)	Materials Remaining in Storage (\$) (D + E - F)
									Date Placed into Storage (Month/Year)	Amount (\$)		
<b>Totals</b>												

**CERTIFICATE OF SUBSTANTIAL COMPLETION**

Owner: **City of Buford**  
 Contractor:  
 Engineer:  
 Project:

Owner's Contract No.:  
 Contractor's Project No.:  
 Engineer's Project No.:  
 Contract Name:

**This [preliminary] [final] Certificate of Substantial Completion applies to:**

All Work

The following specified portions of the Work:

**Date of Substantial Completion**

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows:

Amendments to Owner's responsibilities:	<input type="checkbox"/> None
	<input type="checkbox"/> As follows
Amendments to Contractor's responsibilities:	<input type="checkbox"/> None
	<input type="checkbox"/> As follows

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By:	By:	By:
(Authorized signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title:	Title:	Title:
Date:	Date:	Date:

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**STANDARD GENERAL CONDITIONS OF THE  
CONSTRUCTION CONTRACT**

**TABLE OF CONTENTS**

	Page
<b>ARTICLE 1 - DEFINITIONS AND TERMINOLOGY .....</b>	<b>6</b>
1.01 Defined Terms.....	6
1.02 <i>Terminology</i> .....	9
<b>ARTICLE 2 - PRELIMINARY MATTERS .....</b>	<b>10</b>
2.01 Delivery of Bonds and Evidence of Insurance.....	10
2.02 Copies of Documents .....	10
2.03 Before Starting Construction .....	11
2.04 Preconstruction Conference; Designation of Authorized Representatives.....	11
2.05 Initial Acceptance of Schedules .....	11
2.06 Electronic Transmittals .....	11
<b>ARTICLE 3 - DOCUMENTS: INTENT, REQUIREMENTS, REUSE.....</b>	<b>12</b>
3.01 Intent.....	12
3.02 Reference Standards.....	12
3.03 Reporting and Resolving Discrepancies .....	12
3.04 Requirements of the Contract Documents.....	13
3.05 Reuse of Documents .....	13
<b>ARTICLE 4 - COMMENCEMENT AND PROGRESS OF THE WORK .....</b>	<b>14</b>
4.01 Commencement of Contract Times; Notice to Proceed.....	14
4.02 Starting the Work.....	14
4.03 Reference Points .....	14
4.04 Progress Schedule.....	14
4.05 Delays in Contractor’s Progress .....	14
<b>ARTICLE 5 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONTIDIONS.....</b>	<b>15</b>
5.01 Availability of Lands .....	15
5.02 Use of Site and Other Areas.....	15

5.03 Subsurface and Physical Conditions..... 16

5.04 Differing Subsurface or Physical Conditions ..... 17

5.05 Underground Facilities ..... 18

5.06 Hazardous Environmental Conditions at Site ..... 19

**ARTICLE 6 - BONDS AND INSURANCE ..... 21**

6.01 Performance, Payment, and Other Bonds..... 21

6.02 Insurance—General Provisions ..... 22

6.03 Contractor’s Insurance ..... 23

6.04 Owner’s Liability Insurance ..... 25

6.05 Property Insurance..... 25

6.06 Waiver of Rights ..... 26

6.07 Receipt and Application of Property Insurance Proceeds ..... 27

**ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES ..... 28**

7.01 Supervision and Superintendence ..... 28

7.02 Labor; Working Hours ..... 28

7.03 Services, Materials, and Equipment ..... 28

7.04 “Or Equals” ..... 28

7.05 Substitutes ..... 29

7.06 Concerning Subcontractors, Suppliers, and Others ..... 31

7.07 Patent Fees and Royalties..... 32

7.08 Permits ..... 32

7.09 Taxes ..... 32

7.10 Laws and Regulations..... 33

7.11 Record Documents..... 33

7.12 Safety and Protection ..... 33

7.13 Safety Representative ..... 34

7.14 Hazard Communication Programs ..... 34

7.15 Emergencies..... 34

7.16 Shop Drawings, Samples, and Other Submittals..... 34

7.17 Contractor’s General Warranty and Guarantee ..... 36

7.18 Indemnification ..... 37

7.19 Delegation of Professional Design Services ..... 37



**ARTICLE 8 - OTHER WORK AT THE SITE** ..... 38

    8.01 Other Work ..... 38

    8.02 Coordination ..... 39

    8.03 Legal Relationships..... 39

**ARTICLE 9 - OWNER'S RESPONSIBILITIES** ..... 40

    9.01 Communications to Contractor ..... 40

    9.02 Replacement of Engineer..... 40

    9.03 Furnish Data ..... 40

    9.04 Pay When Due..... 40

    9.05 Lands and Easements; Reports, Tests, and Drawings..... 40

    9.06 Insurance..... 40

    9.07 Change Orders ..... 40

    9.08 Inspections, Tests, and Approvals..... 40

    9.09 Limitations on Owner’s Responsibilities ..... 40

    9.10 Undisclosed Hazardous Environmental Condition..... 40

    9.11 Evidence of Financial Arrangements..... 41

    9.12 Safety Programs ..... 41

**ARTICLE 10 - ENGINEER'S STATUS DURING CONSTRUCTION**..... 41

    10.01 Owner’s Representative..... 41

    10.02 Visits to Site..... 41

    10.03 Project Representative..... 41

    10.04 Rejecting Defective Work..... 41

    10.05 Shop Drawings, Change Orders and Payments..... 41

    10.06 Determinations for Unit Price Work ..... 42

    10.07 Decisions on Requirements of Contract Documents and Acceptability of Work ..... 42

    10.08 Limitations on Engineer’s Authority and Responsibilities ..... 42

    10.09 Compliance with Safety Program..... 42

**ARTICLE 11 - AMMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK**..... 42

    11.01 Amending and Supplementing Contract Documents ..... 42

    11.02 Owner-Authorized Changes in the Work..... 43

    11.03 Unauthorized Changes in the Work..... 43

    11.04 Change of Contract Price ..... 44

11.05 Change of Contract Times ..... 44

11.06 Change Proposals ..... 45

11.07 Execution of Change Orders ..... 45

11.08 Notification to Surety ..... 46

**ARTICLE 12 - CLAIMS ..... 46**

12.01 Claims ..... 46

**ARTICLE 13 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK ..... 47**

13.01 Cost of the Work ..... 47

13.02 Allowances ..... 49

13.03 Unit Price Work ..... 49

**ARTICLE 14 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK ..... 50**

14.01 Access to Work ..... 50

14.02 Tests, Inspections, and Approvals ..... 50

14.03 Defective Work ..... 51

14.04 Acceptance of Defective Work ..... 51

14.05 Uncovering Work ..... 52

14.06 Owner May Stop the Work ..... 52

14.07 Owner May Correct Defective Work ..... 52

**ARTICLE 15 - PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD ..... 53**

15.01 Progress Payments ..... 53

15.02 Contractor’s Warranty of Title ..... 55

15.03 Substantial Completion ..... 56

15.04 Partial Use or Occupancy ..... 56

15.05 Final Inspection ..... 57

15.06 Final Payment ..... 57

15.07 Waiver of Claims ..... 58

15.08 Correction Period ..... 58

**ARTICLE 16 - SUSPENSION OF WORK AND TERMINATION ..... 59**

16.01 Owner May Suspend Work ..... 59

16.02 Owner May Terminate for Cause ..... 59

16.03 Owner May Terminate For Convenience ..... 60

16.04 Contractor May Stop Work or Terminate ..... 60

**ARTICLE 17 - FINAL RESOLUTION OF DISPUTES** ..... 61

17.01 Methods and Procedures..... 61

**ARTICLE 18 - MISCELLANEOUS** ..... 61

18.01 Giving Notice ..... 61

18.02 Computation of Times..... 61

18.03 Cumulative Remedies ..... 61

18.04 Limitation of Damages ..... 62

18.05 No Waiver ..... 62

18.06 Survival of Obligations ..... 62

18.07 Controlling Law ..... 62

18.08 Headings..... 62

**ARTICLE 1 - DEFINITIONS AND TERMINOLOGY**

1.01 Defined Terms

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term’s singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
  - 1. Addenda—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  - 2. Agreement—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
  - 3. Application for Payment—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  - 4. Bid—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  - 5. Bidder—An individual or entity that submits a Bid to Owner.
  - 6. Bidding Documents—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
  - 7. Bidding Requirements—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
  - 8. Change Order—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
  - 9. Change Proposal—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
  - 10. Claim—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer’s decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer’s decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.
  - 11. Constituent of Concern—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49

U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. Contract—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. Contract Documents—Those items so designated in the Agreement, and which together comprise the Contract.
14. Contract Price—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. Contract Times—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. Contractor—The individual or entity with which Owner has contracted for performance of the Work.
17. Cost of the Work—See Paragraph 13.01 for definition.
18. Drawings—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. Effective Date of the Contract—The date, indicated in the Agreement, on which the Contract becomes effective.
20. Engineer—The individual or entity named as such in the Agreement.
21. Field Order—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. Hazardous Environmental Condition—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. Laws and Regulations; Laws or Regulations—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
24. Liens—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. Milestone—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. Notice of Award—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. Notice to Proceed—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. Owner—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

29. Progress Schedule—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. Project—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. Project Manual—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. Resident Project Representative—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.
33. Samples—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. Schedule of Submittals—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. Schedule of Values—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
36. Shop Drawings—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
37. Site—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. Specifications—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. Subcontractor—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. Substantial Completion—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
41. Successful Bidder—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. Supplementary Conditions—The part of the Contract that amends or supplements these General Conditions.
43. Supplier—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

44. **Technical Data**—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. **Underground Facilities**—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. **Unit Price Work**—Work to be paid for on the basis of unit prices.
47. **Work**—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
48. **Work Change Directive**—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. **Intent of Certain Terms or Adjectives:**
  1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. **Day:**
  1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. **Defective:**
  1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:

- a. does not conform to the Contract Documents; or
- b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
- c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

E. *Furnish, Install, Perform, Provide:*

- 1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
- 2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
- 3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
- 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

**ARTICLE 2 - PRELIMINARY MATTERS**

2.01 Delivery of Bonds and Evidence of Insurance

- A. *Bonds:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor's Insurance:* When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner's Insurance:* After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 Copies of Documents

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.



2.03 Before Starting Construction

- A. Preliminary Schedules: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
  1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
  2. a preliminary Schedule of Submittals; and
  3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 Preconstruction Conference; Designation of Authorized Representatives

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 Initial Acceptance of Schedules

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
  2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
  3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 Electronic Transmittals

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

**ARTICLE 3 - DOCUMENTS: INTENT, REQUIREMENTS, REUSE**

3.01 Intent

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 Reference Standards

- A. Standards Specifications, Codes, Laws and Regulations
  - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 Reporting and Resolving Discrepancies

- A. Reporting Discrepancies:
  - 1. Contractor's Verification of Figures and Field Measurements: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. Contractor's Review of Contract Documents: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
  - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
  - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 Requirements of the Contract Documents

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 Reuse of Documents

- A. Contractor and its Subcontractors and Suppliers shall not:
  1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any

other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

**ARTICLE 4 - COMMENCEMENT AND PROGRESS OF THE WORK**

4.01 Commencement of Contract Times; Notice to Proceed

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 Starting the Work

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 Reference Points

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 Progress Schedule

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
  2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 Delays in Contractor's Progress

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
  - 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
  - 2. abnormal weather conditions;
  - 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
  - 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

**ARTICLE 5 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS;  
HAZARDOUS ENVIRONMENTAL CONTIDIONS**

5.01 Availability of Lands

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 Use of Site and Other Areas

- A. Limitation on Use of Site and Other Areas:

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
  2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. Removal of Debris During Performance of the Work: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. Cleaning: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. Loading of Structures: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

### 5.03 Subsurface and Physical Conditions

- A. Reports and Drawings: The Supplementary Conditions identify:
1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
  2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
  3. Technical Data contained in such reports and drawings.
- B. Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the

Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 Differing Subsurface or Physical Conditions

- A. Notice by Contractor: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
  1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
  2. is of such a nature as to require a change in the Drawings or Specifications; or
  3. differs materially from that shown or indicated in the Contract Documents; or
  4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;
    1. then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.
- B. Engineer's Review: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. Owner's Statement to Contractor Regarding Site Condition: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. Possible Price and Times Adjustments:
  1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical

condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
  - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
  - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
    - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
    - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
    - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
  3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
  4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

#### 5.05 Underground Facilities

- A. Contractor's Responsibilities: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
  1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
  2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
    - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
    - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
    - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
    - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.



- B. Notice by Contractor: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. Engineer's Review: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. Owner's Statement to Contractor Regarding Underground Facility: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. Possible Price and Times Adjustments:
  - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
    - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
    - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
    - d. Contractor gave the notice required in Paragraph 5.05.B.
  - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
  - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 Hazardous Environmental Conditions at Site

- A. Reports and Drawings: The Supplementary Conditions identify:
  - 1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

2. Technical Data contained in such reports and drawings.
- B. Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
    1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
    2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
    3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
  - C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
  - D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
  - E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
  - F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
  - G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

## **ARTICLE 6 - BONDS AND INSURANCE**

### **6.01 Performance, Payment, and Other Bonds**

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 Insurance—General Provisions

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

### 6.03 Contractor's Insurance

- A. Workers' Compensation: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
  - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
  - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
  - 4. Foreign voluntary worker compensation (if applicable).
- B. Commercial General Liability—Claims Covered: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
  - 1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
  - 2. claims for damages insured by reasonably available personal injury liability coverage.
  - 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. Commercial General Liability—Form and Content: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
  - 1. Products and completed operations coverage:
    - a. Such insurance shall be maintained for three years after final payment.
    - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
  - 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
  - 3. Broad form property damage coverage.
  - 4. Severability of interest.
  - 5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.
  7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
  8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. Automobile liability: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
  - E. Umbrella or excess liability: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
  - F. Contractor's pollution liability insurance: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
  - G. Additional insureds: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
  - H. Contractor's professional liability insurance: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
  - I. General provisions: The policies of insurance required by this Paragraph 6.03 shall:
    1. include at least the specific coverages provided in this Article.
    2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
    3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
  5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

#### 6.04 Owner's Liability Insurance

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

#### 6.05 Property Insurance

- A. **Builder's Risk:** Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
  1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
  2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
  3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to

provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
  5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
  6. extend to cover damage or loss to insured property while in transit.
  7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
  8. allow for the waiver of the insurer's subrogation rights, as set forth below.
  9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
  10. not include a co-insurance clause.
  11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
  12. include performance/hot testing and start-up.
  13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. Notice of Cancellation or Change: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. Deductibles: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. Partial Occupancy or Use by Owner: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. Additional Insurance: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. Insurance of Other Property: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

#### 6.06 Waiver of Rights



- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
  - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
  - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 Receipt and Application of Property Insurance Proceeds

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

**ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES**

7.01 Supervision and Superintendence

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 Labor; Working Hours

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 Services, Materials, and Equipment

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
  - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that

no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

- a. in the exercise of reasonable judgment Engineer determines that:
    - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
    - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
    - 3) it has a proven record of performance and availability of responsive service; and
    - 4) it is not objectionable to Owner.
  - b. Contractor certifies that, if approved and incorporated into the Work:
    - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
    - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. Contractor's Expense: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. Engineer's Evaluation and Determination: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. Effect of Engineer's Determination: Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. Treatment as a Substitution Request: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

#### 7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
  2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
  3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

- a. shall certify that the proposed substitute item will:
    - 1) perform adequately the functions and achieve the results called for by the general design,
    - 2) be similar in substance to that specified, and
    - 3) be suited to the same use as that specified.
  - b. will state:
    - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
    - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
    - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
  - c. will identify:
    - 1) all variations of the proposed substitute item from that specified, and
    - 2) available engineering, sales, maintenance, repair, and replacement services.
  - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. Engineer's Evaluation and Determination: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. Special Guarantee: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. Reimbursement of Engineer's Cost: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. Contractor's Expense: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. Effect of Engineer's Determination: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

## 7.06 Concerning Subcontractors, Suppliers, and Others

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the

applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
  - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
  - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 Patent Fees and Royalties

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 Permits

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 Taxes

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

### 7.10 Laws and Regulations

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

### 7.11 Record Documents

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

### 7.12 Safety and Protection

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the

Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 Safety Representative

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 Hazard Communication Programs

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 Emergencies

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 Shop Drawings, Samples, and Other Submittals

- A. Shop Drawing and Sample Submittal Requirements:
  - 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
    - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;



- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
    - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
    - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
  2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
  3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.
- B. Submittal Procedures for Shop Drawings and Samples: Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.
  1. Shop Drawings:
    - a. Contractor shall submit the number of copies required in the Specifications.
    - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.
  2. Samples:
    - a. Contractor shall submit the number of Samples required in the Specifications.
    - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
  3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. Other Submittals: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. Engineer's Review:
  1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. Resubmittal Procedures:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  2. normal wear and tear under normal usage.

- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
1. observations by Engineer;
  2. recommendation by Engineer or payment by Owner of any progress or final payment;
  3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
  4. use or occupancy of the Work or any part thereof by Owner;
  5. any review and approval of a Shop Drawing or Sample submittal;
  6. the issuance of a notice of acceptability by Engineer;
  7. any inspection, test, or approval by others; or
  8. any correction of defective Work by Owner.
- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

#### 7.18 Indemnification

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

#### 7.19 Delegation of Professional Design Services

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

**ARTICLE 8 - OTHER WORK AT THE SITE**

8.01 Other Work

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and

proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 Coordination

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
  - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
  - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
  - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 Legal Relationships

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.
- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through

negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

**ARTICLE 9 - OWNER'S RESPONSIBILITIES**

9.01 Communications to Contractor

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 Replacement of Engineer

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 Furnish Data

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 Pay When Due

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 Lands and Easements; Reports, Tests, and Drawings

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 Insurance

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 Change Orders

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 Inspections, Tests, and Approvals

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 Limitations on Owner's Responsibilities

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 Undisclosed Hazardous Environmental Condition

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 Evidence of Financial Arrangements

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 Safety Programs

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

**ARTICLE 10 - ENGINEER'S STATUS DURING CONSTRUCTION**

10.01 Owner's Representative

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 Visits to Site

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 Project Representative

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 Rejecting Defective Work

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 Shop Drawings, Change Orders and Payments

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 Determinations for Unit Price Work

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 Decisions on Requirements of Contract Documents and Acceptability of Work

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 Limitations on Engineer's Authority and Responsibilities

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 Compliance with Safety Program

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

**ARTICLE 11 - AMMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK**

11.01 Amending and Supplementing Contract Documents



- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
  - 1. Change Orders:
    - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
    - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
  - 2. Work Change Directives: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.
  - 3. Field Orders: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 Owner-Authorized Changes in the Work

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 Unauthorized Changes in the Work

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract

Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 Change of Contract Price

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
  - 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
  - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
  - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. Contractor's Fee: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
  - 1. a mutually acceptable fixed fee; or
  - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
    - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
    - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
    - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
    - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
    - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
    - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 Change of Contract Times

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

#### 11.06 Change Proposals

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
  - 1. Procedures: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
  - 2. Engineer's Action: Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
  - 3. Binding Decision: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. Resolution of Certain Change Proposals: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

#### 11.07 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders covering:
  - 1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
  - 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
  - 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the

parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

#### 11.08 Notification to Surety

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

### ARTICLE 12 - CLAIMS

#### 12.01 Claims

- A. Claims Process: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
  2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
  3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. Submittal of Claim: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. Review and Resolution: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. Mediation:
1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
  2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and

decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. Partial Approval: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. Denial of Claim: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. Final and Binding Results: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

**ARTICLE 13 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

13.01 Cost of the Work

- A. Purposes for Determination of Cost of the Work: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
  1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
  2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. Costs Included: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
  1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
  2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits

funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
  - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
  - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
  - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
  - g. The cost of utilities, fuel, and sanitary facilities at the Site.
  - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
  - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

- C. Costs Excluded: The term Cost of the Work shall not include any of the following items:
1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
  2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
  3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
  4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. Contractor's Fee: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

### 13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. Cash Allowances: Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
  2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. Contingency Allowance: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

### 13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
  - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
  - 2. there is no corresponding adjustment with respect to any other item of Work; and
  - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

**ARTICLE 14 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

14.01 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 Tests, Inspections, and Approvals

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.



- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
  - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
  - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
  - 3. by manufacturers of equipment furnished under the Contract Documents;
  - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
  - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.
    - 1. Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.
- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

#### 14.03 Defective Work

- A. Contractor's Obligation: It is Contractor's obligation to assure that the Work is not defective.
- B. Engineer's Authority: Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. Notice of Defects: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. Correction, or Removal and Replacement: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. Preservation of Warranties: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. Costs and Damages: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

#### 14.04 Acceptance of Defective Work

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to

Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

#### 14.05 Uncovering Work

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
  1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
  2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

#### 14.06 Owner May Stop the Work

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

#### 14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend

Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

## **ARTICLE 15 - PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD**

### 15.01 Progress Payments

- A. Basis for Progress Payments: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. Applications for Payments:
  - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
  - 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
  - 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. Review of Applications:
  - 1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
  - 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on

Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
  - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
  - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, requiring correction or replacement;
  - b. the Contract Price has been reduced by Change Orders;
  - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
  - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
  - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. Reductions in Payment by Owner:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
  - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
  - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
  - c. Contractor has failed to provide and maintain required bonds or insurance;
  - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
  - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
  - f. the Work is defective, requiring correction or replacement;
  - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
  - h. the Contract Price has been reduced by Change Orders;
  - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
  - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
  - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - l. there are other items entitling Owner to a set off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 Contractor's Warranty of Title

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

#### 15.03 Substantial Completion

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

#### 15.04 Partial Use or Occupancy

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

#### 15.05 Final Inspection

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 15.06 Final Payment

- A. Application for Payment:
  1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.
  2. The final Application for Payment shall be accompanied (except as previously delivered) by:
    - a. all documentation called for in the Contract Documents;
    - b. consent of the surety, if any, to final payment;
    - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
    - d. a list of all disputes that Contractor believes are unsettled; and
    - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
  3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's

property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

- C. Completion of Work: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

- D. Payment Becomes Due: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 Waiver of Claims

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 Correction Period

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
  1. correct the defective repairs to the Site or such other adjacent areas;
  2. correct such defective Work;
  3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and



4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner’s written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor’s obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

**ARTICLE 16 - SUSPENSION OF WORK AND TERMINATION**

16.01 Owner May Suspend Work

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 Owner May Terminate for Cause

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
  1. Contractor’s persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
  2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
  3. Contractor’s disregard of Laws or Regulations of any public body having jurisdiction; or
  4. Contractor’s repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
  1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
  2. enforce the rights available to Owner under any applicable performance bond.

- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

#### 16.03 Owner May Terminate For Convenience

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
  - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
  - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

#### 16.04 Contractor May Stop Work or Terminate

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

**ARTICLE 17 - FINAL RESOLUTION OF DISPUTES**

17.01 Methods and Procedures

- A. Disputes Subject to Final Resolution: The following disputed matters are subject to final resolution under the provisions of this Article:
  - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
  - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. Final Resolution of Disputes: For any dispute subject to resolution under this Article, Owner or Contractor may:
  - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
  - 2. agree with the other party to submit the dispute to another dispute resolution process; or
  - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

**ARTICLE 18 - MISCELLANEOUS**

18.01 Giving Notice

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
  - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
  - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 Computation of Times

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 Cumulative Remedies

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 Limitation of Damages

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 No Waiver

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 Survival of Obligations

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 Controlling Law

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 Headings

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

**SECTION 008000 - SUPPLEMENTARY CONDITIONS**

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (No. C-700, 2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

<b>TABLE OF CONTENTS</b>		<b>Page</b>
SC-2.01.C	Delivery of Bonds and Evidence of Insurance	2
SC-2.02.A	Copies of Documents	2
SC-4.01.A	Commencement of Contract Times; Notice to Proceed	2
SC-5.03.B	Subsurface and Physical Conditions	2
SC-5.06	Hazardous Environmental Conditions at Site	3
SC-6.02	Insurance – General Provisions	3
SC-6.03	Contractor’s Insurance	3
SC-7.02.B	Labor; Working Hours	4
SC-7.02.C	Overtime Pay or Other Expenses	4
SC-7.06	Concerning Subcontractors, Suppliers, and Others	4
SC-10.03.A	Project Representative	4
SC-15.01.B.4	Application for Payment; Retainage Investment	7

**ARTICLE 2 – PRELIMINARY MATTERS**

**SC-2.01.C Add the following paragraph 2.01.D after paragraph 2.01.C:**

D. Owner and Contractor will furnish Owner’s attorney such evidence as required so that Owner’s attorney can complete and execute the Section 005410 “Certificate of Owner’s Attorney”.

**SC-2.02.A Amend the first sentence of Paragraph 2.02.A to read as follows:**

Owner shall furnish to Contractor 2 copies of the Contract Documents (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

**ARTICLE 4 – COMMENCEMENT AND PROSECUTION OF THE WORK**

**SC-4.01.A Delete the last sentence in Paragraph 4.01.A beginning with “In no event will...”**

**ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS**

**SC-5.03.B Add the following new paragraphs immediately after Paragraph 5.03.B:**

- C. The following reports of exploration and tests of subsurface conditions at or adjacent to the Site are known to the Owner:
  - 1. Report dated July 31, 2020, prepared by ECS Southeast, LLP entitled: “Geotechnical Engineering Report, Buford Waterworks Replacement”, consisting of 50 pages. The Technical Data contained in such a report upon whose accuracy Contractor may rely are as indicated in the definition of Technical Data in the General Conditions. This Report is available electronically upon request to the Engineer.

2. Drawing dated August 20, 2020, prepared by ECS Southeast, LLP entitled: "Level 3 Soil Survey For On-Site Wastewater Disposal", consisting of one page. The Technical Data contained in such a report upon whose accuracy Contractor may rely are as indicated in the definition of Technical Data in the General Conditions. This Report is available electronically upon request to the Engineer.
3. Report dated June, 2020, prepared by MER Commercial Diving Division entitled: "June 2020 Diving Report", consisting of six pages. The Technical Data contained in such a report upon whose accuracy Contractor may rely are as indicated in the definition of Technical Data in the General Conditions. This Report is available electronically upon request to the Engineer.
4. Report dated October 8, 2020, prepared by Stability Engineering entitled: "Load Capacity of Existing Structure", consisting of three pages. The Technical Data contained in such a report upon whose accuracy Contractor may rely are as indicated in the definition of Technical Data in the General Conditions. This Report is available electronically upon request to the Engineer.
5. Drawings date July 1993, prepared by Piedmont, Olsen, Hensley entitled "City of Buford Water Treatment Plant Improvements", consisting of 36 sheets. The Technical Data contained in such drawings upon whose accuracy Contractor may rely are as indicated in the definition of Technical Data in the General Conditions. These drawings are available electronically upon request to the Engineer.
6. Drawings dated November 1955, prepared by J.B. McCrary Engineering Corp. entitled "Buford Ga Raw Water Intake & Pump Sta.", consisting of 2 sheets. The Technical Data contained in such drawings upon whose accuracy Contractor may rely are as indicated in the definition of Technical Data in the General Conditions. These drawings are available electronically upon request to the Engineer.
7. Report dated November 11, 2020 prepared by ECS Southeast, LLP entitled "Asbestos & Lead-Based Paint Assessment Water Works Building" consisting of 24 pages. The Technical Data in such a report upon whose accuracy Contractor may rely are as indicated in the definition of Technical Data in the General Conditions. This report is available electronically upon request to the Engineer.

**SC-5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:**

- A. No reports or drawings related to Hazardous Environmental Condition at the Site are known to the Owner.
- B. Not used.

**ARTICLE 6 – BONDS AND INSURANCE**

**SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:**

1. Contractor may obtain worker’s compensation insurance from an insurance has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the project is located, (b) is certified or authorized as a worker’s compensation insurance provide by the appropriate state agency, and (c) has been accepted to provide worker’s compensation insurance for similar projects by the state within the last 12 months.

**SC-6.03 Delete Paragraph 6.03.J in its entirety.**

**SC-6.03 Add the following new paragraph immediately after Paragraph 6.03.J:**

- K. The limits of liability for insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:
  1. Workers’ Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

Employer's Liability:	
Bodily injury, each accident	\$2,000,000.00

Bodily injury by disease, each employee	\$2,000,000.00
Bodily injuryby disease aggregate	\$2,000,000.00

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	\$5,000,000.00
Products - Completed Operations Aggregate	\$5,000,000.00
Personal and Advertising Injury	\$5,000,000.00
Each Occurrence	\$5,000,000.00
Damage to Rented Premises (Each Occurance)	\$5,000,000.00
Medical Expenses (Any one Person)	\$10,000.00

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Combined Single Limit (Ea. Accident)	\$5,000,000.00
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4. Umbrella or Excess Liability under Paragraph 6.03.E. of the General Conditions:

Per Occurrence	\$5,000,000.00
General Aggregate	\$5,000,000.00

4. Contractor's Pollution Liability under Paragraph 6.03.F. of the General Conditions:

Each Occurrence	\$1,000,000.00
General Aggregate	\$2,000,000.00
<input type="checkbox"/> If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract	

**ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES**

**SC-7.02.B Add the following new subparagraphs immediately after Paragraph 7.02.B:**

1. Regular working hours will be 7 a.m. to 5 p.m.
2. Owner's legal holidays are New Year's Day, Martin Luther King Jr. Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day after Thanksgiving, Christmas Eve, and Christmas Day. If the holiday falls on Saturday the preceding Friday shall be observed as the holiday. If the holiday falls on a Sunday, the following Monday shall be observed as the holiday.

**SC-7.02.C Add the following new paragraph immediately after Paragraph 7.02.B:**

C. **Owner** shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer’s services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day.

1. For purposes of administering the foregoing requirement, additional overtime costs are defined as **here insert parameters for compensated overtime**

**SC-7.06 Add a new paragraph immediately after Paragraph 7.06.O:**

P. The Contractor shall not award work valued at more than fifty (50%) percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

**ARTICLE 8 – OTHER WORK AT THE SITE**

**SC-8.02 Delete Paragraph 8.02.A in its entirety and replace with the following:**

A. Owner intends to contract with others for the performance of other work at or adjacent to the Site.

1. The Contractor for this project shall have authority and responsibility for coordination of the various contractors and work forces at the Site;

2. The following specific matters are to be covered by such authority and responsibility:
  - a. Coordinate site work schedules to avoid site work conflicts,
  - b. Providing access to other Contractors to permit work completion within the Contract Time,
  - c. Cooperate with other Contractors as needed for completion of their work;
3. The extent of such authority and responsibilities is: Designating sufficient time periods for site work completion, frequent communications with owner and other Contractors for coordination of the work.

## **ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION**

### **SC-10.03.A Add the following new paragraphs immediately after Paragraph 10.03.A:**

B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.

1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer 3. concerning acceptability.
3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
4. Liaison:
  - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
  - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
  - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
6. Shop Drawings and Samples:
  - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
  - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
  - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. Review of Work and Rejection of Defective Work:
  - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance



with the Contract Documents.

- b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
9. Inspections, Tests, and System Start-ups:
  - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
  - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups
10. Records:
  - a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
  - b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
  - c. Maintain records for use in preparing Project documentation.
11. Reports
  - a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
  - b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
  - c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work
13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.
14. Completion
  - a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.

- b. Participate in Engineer’s final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR Shall Not:

- 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including “or-equal” items).
- 2. Exceed limitations of Engineer’s authority as set forth in the Contract Documents.
- 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
- 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor’s work.
- 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
- 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
- 7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
- 8. Authorize Owner to occupy the Project in whole or in part.

**ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD**

**SC-15.01.B.4 Add the following Paragraph (s) after Paragraph 15.01.B.3:**

- 4. The Application for Payment form to be used on this Project is EJCDC No. C-620. The Agency must approve all Applications for Payment before payment is made.
- 5. Retainage Investment: The retainage amount withheld in the Contractor's Application for Payments shall be invested by the Owner at the current market rate for the duration of the Project. If the Project is completed within the time limits specified and at the Contract Price specified, subject to any authorized modification thereto, the interest earned on the retainage shall be paid to the Contractor. Any expenses charged by the financial institution for the retainage investment account will be deducted from the interest earned on the account. Payment of the interest to the Contractor shall be made with the final payment, after the Engineer certifies that the Work, including incomplete minor items remaining after substantial completion, has been completed within the time specified and within the current will retain the interest earned on retainage.

END OF SECTION

**Field Order**

---

Date of Issuance:	Effective Date:
Owner: <b>City of Buford</b>	Owner Project No.:
Contractor:	Contractor Project No.:
Engineer: <b>Keck &amp; Wood, Inc.</b>	Engineer's Project No.: <b>170110</b>
Project: <b>Buford Water Works Replacement</b>	Contract Name: <b>Buford Water Works Replacement</b>

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Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

References: \_\_\_\_\_  
                                    Specifications(s)    Drawings(s)/Detail(s)

Description: \_\_\_\_\_

Attachments: *(List documents supporting change)*

---

ISSUED:		RECEIVED:	
By: _____	Engineer (Authorized Signature)	By: _____	Contractor (Authorized Signature)
Title: _____		Title: _____	
Date: _____		Date: _____	

Copy to: Owner

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**Change Order**

Date of Issuance:	Effective Date:
Owner: <b>City of Buford</b>	Owner Project No.:
Contractor:	Contractor Project No.:
Engineer: <b>Keck &amp; Wood, Inc.</b>	Enginner's Project No.: <b>170110</b>
Project: <b>Buford Water Works Replacement</b>	Contract Name: <b>Buford Water Works Replacement</b>

The Contract is modified as follows upon execution of this Change Order:  
Description:

Attachments: *[List documents supporting change]*

<b>CHANGE IN CONTRACT PRICE</b>	<b>CHANGE IN CONTRACT TIMES</b>
Original Contract Price:	Original Contract Times:
\$ _____	Substantial Completion: _____
	Ready for Final Payment: _____
	days or dates

[Increase][Decrease] from previously approved Change Orders No. ___ to No. ___	[Increase][Decrease] from previously approved Change Orders No. ___ to No. ___
\$ _____	Substantial Completion: _____
	Ready for Final Payment: _____
	days

Change Price prior to this Change Order:	Contract Times prior to this Change Order:
\$ _____	Substantial Completion: _____
	Ready for Final Payment: _____
	days or dates

[Increase][Decrease] from previously approved	[Increase][Decrease] from previously approved
\$ _____	Substantial Completion: _____
	Ready for Final Payment: _____
	days or dates

Contract Price incorporating this Change Order:	Contract Times with all approved Change Orders:
\$ _____	Substantial Completion: _____
	Ready for Final Payment: _____
	days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (if required)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

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**SECTION 011000 - SUMMARY****PART 1 GENERAL****1.1 PROJECT**

- A. Project Name: Buford Water Works Replacement.
  - 1. Project Location: 3370 North Waterworks Road Buford Georgia 30518
- B. Owner's Name: City of Buford .
- C. Engineer's Name: Keck and Wood, Inc., 3090 Premiere Parkway Suite 200 Duluth, GA 30097 .
- D. Other Owner Consultant: the following design professionals have been retained by the Engineer and have provided the following portion of the Contract Documents.
  - 1. Membrane Filtration System: Suez Water Technologies.
    - a. Membrane Filtration System Representative: Shawn Hourtovenko, 1-647-504-7100
    - b. Scope of Services include: Membrane filtration system design, delivery, and inspection as listed in Section 466100 - Filtration Equipment.
  - 2. Electrical: Womack & Associates Consulting Engineers.
    - a. Electrical Representative: Bill Womack, 770-378-4743
    - b. Scope of Services include: Electrical design including MCC, equipment power, lights, and other electrical services.
  - 3. Architectural: Sutton Architectural Services, Inc.
    - a. Architectural Representative: Peter C. Sutton, (770) 442-8682
    - b. Scope of Services include: Architectural design including building floor plan, finish, door, and stair plans and schedules, and building material selections.
  - 4. Structural: Shear Structural.
    - a. Structural Representative: Holly Jeffreys, P.E., (678) 664-8051
    - b. Scope of Services include: Structural design including the building foundation and interior structural components, high service pump station structural design, bridge crane structural design, and structural design of the screening structure.
  - 5. Mechanical: S&S Engineers.
    - a. HVAC/Plumbing Representative: Les Saunders, P.E. (770) 933-8842
    - b. Scope of Services include: HVAC heating and air conditioning system design for building, and Plumbing design consisting of laboratory plumbing, water service, and sanitary plumbing.

**1.2 SUMMARY NARRATIVE**

- A. The Work involved within the Project is defined by the Contract documents; The Project consists of, but is not limited to the construction of the following: renovating a raw water pump station and constructing a new raw water pipeline, screen structure, two clearwell structures, high service pump station, metering vaults, a process and administration building for membrane treatment, installation of all associated equipment, and all related yard piping, appurtenances, electrical, civil, and SCADA.

**1.3 CONTRACT DESCRIPTION**

- A. Contract Type:
  - 1. Project will be Awarded and constructed under a single prime contract.

#### 1.4 WORK UNDER OWNER'S SEPARATE CONTRACTS

- A. Work with Separate Contractors: Cooperate fully with owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.
- B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.
  - 1. SCADA Programming and Controls Subcontractor for the following work as described below:
    - a. Furnishing the assembled and tested Buford Raw Water Pump Station SCADA Panel, High Service Pump Station SCADA Panel, and Main Plant SCADA Panel for installation by the contractor. Buford's SCADA panels includes major components such as PLC, UPS, and fiber optic/ethernet switch, as well as factory acceptance test (FAT), operational readiness test (ORT), and functional demonstration test (FDT).
    - b. Furnish new SCADA software and programming to allow remote monitoring and control for the Buford Water Works.
    - c. Furnish programming within the Buford SCADA panels. Wire terminations are to be provided by the Contractor.
    - d. Furnish programming between the Buford Main Plant SCADA panel and the SUEZ PLC main control panel.
    - e. Furnishing of SCADA program development software with licenses, as applicable.
    - f. Furnish startup services for the Buford PLC SCADA panels i/o checkouts.
    - g. Furnish catalog cutsheets, electrical schematic drawing package, field and control panel equipment submittals, operational and maintenance manuals, and equipment submittals for the Buford PLC SCADA panel and panel content.
    - h. Freight and sales taxes for the delivery of the Buford PLC SCADA panels to the site.
    - i. Warranty is included in the furnished Buford PLC SCADA panels.
  - 2. Wire terminations between the Buford Raw Water Pump Station SCADA Panel and related field devices, High Service Pump Station SCADA Panel and related field devices, Main Plant SCADA Panel and related field devices, and the SUEZ PLC main control panel and related field devices are to be provided by the Contractor. Wire terminations between the Buford Raw Water Pump Station SCADA Panel, High Service Pump Station SCADA Panel, Main Plant SCADA Panel, and the SUEZ PLC main control panel are to be provided by the Contractor.

#### 1.5 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Schedule the Work to accommodate Owner occupancy.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
  - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.



1.6 OWNER'S PRODUCT PURCHASE CONTRACTS

- A. Owner has negotiated Product Purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these Product Purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum unless otherwise indicated.
  - 1. Contractor's responsibilities are same as if Contractor had negotiated Product Purchase contracts, including responsibility to execute final purchasing agreements.
- B. Owner's Product Purchase Contracts Information:
  - 1. Membrane Filtration System Procurement Contract: See Exhibit A and B.
    - a. Purchase Contract Firm and Representative: Zenon Environmental Corporation and Suez WTS Systems USA, Inc., Jenn Watt, Regional Manager.jenn.watt@suez.com.
    - b. Product Purchase Contract Scope: Furnishing materials, commissioning services, and support.
    - c. Product Purchase Status: Price negotiated by Owner, to be incorporated into the Contract Price by Contractor, see Section 012100 "Allowances" for cash allowance for Product Purchase contract remaining balance.

1.7 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
  - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Limited Use of the Site: Contractor shall have limited use of the Project site for construction activities, as reflected by the construction limits shown in the drawings and as defined as follows:
  - 1. Building access and entrances, walkways, driveways, delivery locations, and parking: shall be kept clear and available for use by the Owner, Owner's employees, Owner deliveries and emergency vehicles at all times.
    - a. Contractor deliveries shall be scheduled in a manner as to minimize the use of entrances, walkways, and driveways.
    - b. Contractor deliveries shall be coordinated with construction activities in a manner as to minimize the space and time required for on-site storage of equipment and materials.
- C. Provide access to and from site as required by law and by Owner:
  - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
  - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Existing building spaces may not be used for storage.

1.8 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Engineer.

1.9 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work at the Project site to normal working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
  - 1. Weekend Hours: None without prior approval from the Owner.
  - 2. Early Morning Hours: As coordinated with Owner through Engineer.

3. Hours for Utility Shutdowns: None without prior approval from Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities for facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to the requirements indicated.
  1. Notify Engineer and Owner not less than two days in advance of proposed utility interruptions.
  2. Obtain Engineer's written permission before proceeding with utility interruptions.
- D. Employee identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.10 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

- A. Division 00 Contracting Requirements Sections: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- B. Division 01 General Requirements Sections: Requirements in Division 01 Sections apply to the Work of all Sections in the Specifications.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

**SECTION 012000 - PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

**1.2 SUMMARY**

- A. Section includes the necessary procedural and administrative requirements related to preparing and processing the Contractor's Applications for Payment.

**1.3 RELATED REQUIREMENTS**

- A. Section 005200 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.
- B. Section 007000 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.
- C. Section 012100 - Allowances: Payment procedures relating to allowances.
- D. Section 012200 - Unit Prices: Monetary values of unit prices; Payment and modification procedures relating to unit prices.
- E. Section 017800 - Closeout Submittals: Project record documents.

**1.4 SCHEDULE OF VALUES**

- A. Use Schedule of Values Form: EJCDC C-620, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Engineer for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section.
- F. Revise schedule to list approved Change Orders, with each Application For Payment.

**1.5 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Form EJCDC C-620.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Engineer for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.

- 6. Authorized Change Orders.
- 7. Total Completed and Stored to Date of Application.
- 8. Percentage of Completion.
- 9. Balance to Finish.
- 10. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- I. Submit one electronic and three hard-copies of each Application for Payment.
- J. Include the following with the application:
  - 1. Transmittal letter as specified for submittals in Section 013000.
  - 2. Construction progress schedule, revised and current as specified in Section 013000.
  - 3. Current construction photographs specified in Section 013000.
  - 4. Affidavits attesting to off-site stored products.
- K. When Engineer requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.6 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Engineer will issue instructions directly to Contractor, using form EJCDC C-942.
- C. For other required changes, Engineer will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order, using form EJCDC C-941.
  - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
  - 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Engineer will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 20 days.
- E. Contractor may propose a change by submitting a request for change to Engineer, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.
  - 1. Include a written statement detailing the reasoning for the proposed change and the impact of the change to the overall Work.
  - 2. Include a list of products and quantities required, either increase or decrease, along with the unit cost, with total amounts of credits or purchases.
  - 3. include all associated cost including, but not limited to, items such as delivery costs, labor and supervision, equipment rental fee, directly associated with the change.

4. Provide a revised construction schedule that reflects the change, including, but not limited to, new activities and/or impact to the duration of existing activities, including start and finish times.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
    1. For change requested by Engineer for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
    2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order, with substantiated costs, as approved by Engineer.
    3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
  - G. Substantiation of Costs: Provide full information required for evaluation.
    1. On request, provide the following data:
      - a. Quantities of products, labor, and equipment.
      - b. Taxes, insurance, and bonds.
      - c. Overhead and profit.
      - d. Justification for any change in Contract Time.
      - e. Credit for deletions from Contract, similarly documented.
  - H. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
  - I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
  - J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
  - K. Promptly enter changes in Project Record Documents.
- 1.7 APPLICATION FOR SUBSTANTIAL COMPLETION PAYMENT
- A. Prepare Application for Substantial Completion Payment as specified for progress payments, identifying 100 percent completion of the Work claimed substantially complete.
  - B. Provide documentation which substantiates that the Work is substantially complete, to include results from all testing requirements, completion of required training, and delivery of operations and maintenance materials.
- 1.8 APPLICATION FOR FINAL PAYMENT
- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
  - B. Application for Final Payment will not be considered until the following have been accomplished:
    1. All closeout procedures specified in Section 017000.
    2. Certificate of completion of final punch list items.
    3. Final liquidated damages statement of settlement.
    4. Waivers and release of liens, from all entities involved with prosecution of the Work, for each entity lawfully entitled to a lien.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

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**SECTION 012100 - ALLOWANCES****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Cash allowances, including stipulated-price, unit-cost, and quantity allowances.
- B. Inspecting and testing allowances.
- C. Payment and modification procedures relating to allowances.
- D. Contingency allowance.

**1.2 RELATED REQUIREMENTS**

- A. Section 012000 - Price and Payment Procedures: Additional payment and modification procedures.
- B. Section 012200 - Unit Prices: Additional unit price procedures.
- C. Section 012600 - Contract Modification Procedures: Additional Change Order procedures.
- D. Section 014000 - Quality Requirements: Additional field testing by an independent testing agency procedures.

**1.3 DEFINITIONS**

- A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

**1.4 CASH ALLOWANCES**

- A. Cash Allowances include stipulated-price, unit-cost, and quantity allowances.
- B. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, including taxes, freight and delivery to Project site, unless noted otherwise in the allowance description.
- C. Costs Not Included in Cash Allowances: Product handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; labor for installation and finishing; applicable trade discounts; and overhead and profit, unless noted otherwise in the allowance description.
- D. Engineer Responsibilities:
  - 1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
  - 2. Select products in consultation with Owner and transmit decision to Contractor.
  - 3. Prepare and submit Change Order.
- E. Contractor Responsibilities:
  - 1. Advise Engineer the date when the selection of each item described by an allowance must be completed by the Owner in order to avoid delays in the Work at the earliest practicable date.
  - 2. Assist Engineer in selection of products, suppliers, and installers.
  - 3. Obtain proposals from suppliers and installers and offer recommendations.
  - 4. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
  - 5. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
  - 6. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage or return to manufacturer or supplier for replacement.

- 7. Provide invoices or delivery slips to show actual quantities of materials delivered to the site for allowance.
  - 8. Submit documentation to show labor time and cost for installation of each allowance that includes installation.
  - 9. Coordinate installation for each allowance to ensure that each allowance item is completely integrated with all related work.
- F. Differences in costs will be adjusted by Change Order.
- G. Unused Material: After installation of allowance items has been completed and accepted, return to manufacturer or supplier for credit to Owner any unused materials purchased under an allowance.

#### 1.5 CONTINGENCY ALLOWANCE

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- B. Funds will be drawn from the Contingency Allowance only by Change Order as directed by Engineer for Owner 's purposes.
- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

#### 1.6 INSPECTING AND TESTING ALLOWANCES

- A. Costs Included in Inspecting and Testing Allowances: Cost of engaging an inspecting or testing agency; execution of inspecting and tests; and reporting results.
- B. Costs Not Included in the Inspecting and Testing Allowances:
  - 1. Costs of incidental labor and facilities required to assist inspecting or testing agency.
  - 2. Costs of testing services used by Contractor separate from Contract Document requirements.
  - 3. Costs of retesting upon failure of previous tests as determined by Engineer.
- C. Payment Procedures:
  - 1. Submit one copy of the inspecting or testing firm's invoice with next application for payment.
  - 2. Pay invoice on approval by Engineer.
- D. Differences in cost will be adjusted by Change Order.
- E. At closeout of Contract, funds remaining in Inspecting and Testing Allowance will be credited to Owner by Change Order.

#### 1.7 ADJUSTMENT OF ALLOWANCES

- A. Prepare a Change Order based on the difference between the allowance and actual purchase amount to adjust allowance amounts. Include reasonable allowances for normal product imperfections, required maintenance materials, cutting losses, tolerances, mixing wastes, and similar margins as applicable.
  - 1. Include costs such as installation only where included as part of the allowance.
  - 2. Submit documentation to substantiate overhead costs and other markups if requested.
  - 3. Submit substantiation of a change in scope of works, if any, claimed in Change Orders related to allowances.
  - 4. Owner reserves the right to establish quantities through the use of independent parties.
- B. Submit claims for increased costs caused by a change in the nature or scope of the allowance item described in the Contract Documents.



1. Do not include indirect expenses unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information provided in the Contract Documents.

1.8 ALLOWANCES SCHEDULE

- A. Allowance No. 1: Include the stipulated sum of \$4,000.00 for shop drawing preparations, fabrication and delivery of a Cast Metal Plaque including mounting hardware. Shop drawing processing, handling, installation, and related costs of the Contractor are not included in the allowance.
- B. Allowance No. 2: Quantity Allowance: Include 350 cubic yards of rock excavation, removal, and replacement with satisfactory soil materials as needed as specified in Division 31 Section for Rock Removal. Coordinate quantity allowance adjustment with unit price requirements in Section 012200 - Unit Prices.
- C. Allowance No. 3: Inspecting and Testing Allowance: Include the sum of \$150,000.00 for payment of inspecting and testing services specified in Section 014000-Quality Requirements.
- D. Allowance No. 4: Furnishings and Fixtures: Include the sum of \$15,000.00 for the furnishing of all architectural furnishings and fixtures. Contractor costs for receiving, handling, installation costs, and Contractor overhead and profit are not a part of the allowance and are to be included in the Contract Sum.
- E. Allowance No. 5: Membrane Filtration System Procurement Contract Remaining Balance: Include the sum of \$960,000.00 for the remaining balance due for the Membrane Filtration System Procurement. Allowance amount also includes sales taxes and import taxes, if any, for the materials purchased under this allowance.
- F. Allowance No. 6: Security, TV Monitors, AV Systems and Appliances: Include the sum of \$200,000.00 for the furnishing of all security, TV monitors, AV systems, data, telephone, and the appliances, window shades, and other items that are noted on Sheet A1.8. Contractor costs for receiving, handling, installation costs, and Contractor overhead and profit are not a part of the allowance and are to be included in the Contract Sum.
- G. Allowance No. 7: Contingency Allowance: Include the stipulated sum of \$100,000.00 for use upon Owner's instructions.
- H. Allowance No. 8: Quantity Allowance: Include 300 cubic yards of stabilization stone for removal of unsuitable soil subgrade materials and replacement with coarse granular fill as authorized and specified in Division 31 Sections for Excavation, Trenching, and Fill. Coordinate quantity allowance adjustment with unit price requirements in Section 012200 - Unit Prices.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not used

END OF SECTION

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**SECTION 012200 - UNIT PRICES**

## 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 unit prices.
- B. Related Requirements:
  - 1. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.
  - 2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
  - 3. Section 014000 "Quality Requirements" for field testing by an independent testing agency.

## 1.3 DEFINITIONS

- A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

## 1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Total compensation to the Contractor will be computed from the authorized quantity of satisfactorily completed Bid unit price items comprising the completed Work. No item will be measured for payment unless that item consists of authorized work and appears on the Bid form or is included in a Change Order. Payment for necessary work which is not directly related to a unit price item, such as mobilization and demobilization, is considered to be distributed pro rata among authorized unit price items.
- C. The Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

## PART 2 PRODUCTS (Not Used)

## PART 3 EXECUTION

## 3.1 SCHEDULE OF ADJUSTMENT UNIT PRICES

- A. Adjustment Unit Price for Allowance No. A2: Rock Excavation and Removal
  - 1. This item will be measured for payment on a cubic yard (CY) basis to the nearest one-half cubic yard.
  - 2. Where necessary to excavate rock material in quantities of more than one (1) cubic yard, such material will be measured using the bid adjustment unit price per cubic yard. The actual quantity of rock excavation in excess of (price increase) or below (price decrease) the quantity allowance of 350 cubic yards will be multiplied by the bid adjustment unit price to determine a change in contract price for rock excavation different from the allowance quantity.

3. Measurement of rock excavation volume in cubic yards (CY) will be made by profiling the average top elevation of rock visible at sides of excavation, presuming the level to which rock is removed at one half (0.5) foot below utility line, and presuming trench width over its entire length to be the sum of the nominal pipe diameter plus eighteen (18) inches. At structures and miscellaneous construction, the actual necessary rock volume removed will be determined using the rock removal distances as specified in earthwork sections.
- B. Adjustment Unit Price for Allowance No. A8: Stabilization Stone
1. This item will be measured for payment on a cubic yard basis to the nearest one-half cubic yard.
  2. Where desirable in the opinion of the Owner or Engineer to use a coarse granular fill material (stabilization stone) to backfill authorized over-excavation of unsuitable in-place foundation material, such granular fill material will be authorized and measured and paid using the bid adjustment unit price per cubic yard. The actual quantity of stabilization stone in excess (price increase) or below (price decrease) the quantity allowance will be multiplied by the bid adjustment unit price to determine a change in contract price for stabilization stone different from the allowance quantity.
  3. When the unsuitable nature of in-place material arises out of wet trench or subgrade conditions, coarse granular fill material will be authorized only where alternative techniques (including dewatering methods) are impractical as determined by the Owner or Engineer.
  4. Measurement for payment of coarse granular fill material will not be made where such material is part of a required pipe foundation bedding, building foundation bedding, or where such material is used by the Contractor solely to increase production or utilize a lesser strength pipe when permitted by an improved pipe foundation. Such additional use of coarse granular fill material in bedding pipe or for other purposes is considered an incidental cost of constructing piping and no separate payment will be made therefore.
  5. When the use of coarse granular fill material is authorized, its volume in cubic yards (CY) will be computed by multiplying (1) the horizontal length of stabilization stone construction along the pipe or building centerline by (2) the authorized depth of stabilization stone by (3) the narrowest maximum pipe trench width authorized in the specifications or the authorized width of building area. Fine granular material for pipe or structure bedding is not a pay item, and its use is solely at Contractor's option.
  6. Payment for stabilization stone shall be full compensation for furnishing and placing coarse granular fill material, including over-excavation of trench or subgrade area and related work.

END OF SECTION

**SECTION 012300 - ALTERNATES****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Price and Contract Time.

**1.2 RELATED REQUIREMENTS**

- A. Document 002100 - Instructions to Bidders: Instructions for preparation of pricing for Alternatives.
- B. Construction Drawings
- C. Document 007000 - Standard General Conditions of the Construction Contract
- D. Document 008000 - Supplementary Conditions
- E. Division 01 Specification Sections

**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 the base bid amount if the Owner decides to accept a corresponding change in either 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 or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

**1.4 ACCEPTANCE OF ALTERNATES**

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

**1.5 SCHEDULE OF ALTERNATES**

- A. Alternate No. 1 - Clearwell No. 2:
  - 1. Base Bid: Construction of the Water Works Replacement as indicated on the construction drawings with no work on the Clearwell No. 2 and associated piping connections to Clearwell No. 2. Base bid includes providing pipe plugs or valves and plugs where indicated for future connection to Clearwell No. 2.
  - 2. Alternate: Construction of clearwell No.2 as specified in Section 331636 "Prestressed Concrete Storage Tanks" and indicated on Construction Drawings. Provide construction of Clearwell No.2 and all related baffles, additional items, appurtenances, and testing as indicated in the Drawings and specified within Section 331636. Provide construction of DIP influent, effluent, and overflow piping, associated trenching, and connections. Provide construction of 4" CPVC secondary disinfection chemical . Provide construction of all necessary related appurtenances, accessories, and related components necessary for the complete construction of the clearwell and related connecting piping for complete testing and operations.
- B. Alternate No. 2 - Bridge Crane Beam and Column Support Material of Construction:
  - 1. Base Bid: Construction of the bridge crane support beams and columns as indicated on the Construction Drawings utilizing stainless steel.
  - 2. Alternate: Utilization of galvanized carbon steel for the construction of the bridge crane beams and columns.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

**SECTION 012500 - SUBSTITUTION PROCEDURES**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.2 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.
- B. Section 012100 - Allowances, for cash allowances affecting this section.
- C. Section 012200 - Unit Prices, for additional unit price requirements.
- D. Section 012300 - Alternates, for product alternatives affecting this section.
- E. Section 013000 - Administrative Requirements: Submittal procedures, coordination.
- F. Section 016000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.3 DEFINITIONS

- A. Substitutions: See General Conditions for definition.

1.4 REFERENCE STANDARDS

- A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage) Current Edition.
- B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase) Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
  - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
  - 1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. No specific form is required. Contractor's Substitution Request documentation must include the following:
    - a. Project Information:

- 1) Official project name and number, and any additional required identifiers established in Contract Documents.
- 2) Owner's, Engineer's, and Contractor's names.
- b. Substitution Request Information:
  - 1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
  - 2) Indication of whether the substitution is for cause or convenience.
  - 3) Issue date.
  - 4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
- c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
- d. Impact of Substitution:
- D. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

### 3.2 RESOLUTION

- A. Engineer may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Engineer will notify Contractor in writing of decision to accept or reject request.
  - 1. Engineer's decision following review of proposed substitution will be noted on the submitted form.

### 3.3 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

END OF SECTION



**SECTION 012600 - CONTRACT MODIFICATION 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 handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

## 1.3 MINOR CHANGES IN THE WORK

- A. Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on form included in Project Manual.

## 1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Engineer are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    - e. Quotation Form: Use forms acceptable to Engineer.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Engineer.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Engineer.

C. ADMINISTRATIVE CHANGE ORDERS

1. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
2. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

D. CHANGE ORDER PROCEDURES

1. On Owner's approval of a Work Change Proposal Request, Engineer will issue a Change Order for signatures of Owner and Contractor on form included in Project Manual.

E. WORK CHANGE DIRECTIVE

1. Work Change Directive: Engineer may issue a Work Change Directive on form included in Project Manual. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - a. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
2. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
  - a. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 013000 - ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Contractor's daily reports.
- G. Progress photographs.
- H. Submittals for review, information, and project closeout.
- I. Number of copies of submittals.
- J. Requests for Interpretation (RFI) procedures.
- K. Submittal procedures.

**1.2 RELATED REQUIREMENTS**

- A. Section 007000-Standard General Conditions of the Contract
- B. Section 013216 - Construction Progress Schedule: Form, content, and administration of schedules.
- C. Section 016000 - Product Requirements: General product requirements.
- D. Section 017000 - Execution: Additional coordination requirements.
- E. Section 017800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.
- F. Section 019113 - General Commissioning Requirements: Additional procedures for submittals relating to commissioning.
  - 1. Where submittals are indicated for review by both Engineer and the Commissioning Authority, submit one extra and route to Engineer first, for forwarding to the Commissioning Authority.
  - 2. Where submittals are not indicated to be reviewed by Engineer, submit directly to the Commissioning Authority; otherwise, the procedures specified in this section apply to commissioning submittals.

**1.3 REFERENCE STANDARDS**

- A. CSI/CSC Form 12.1A - Submittal Transmittal Current Edition.
- B. CSI/CSC Form 13.2A - Request for Information Current Edition.

**1.4 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 017000 - Execution for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Engineer:
  - 1. Subcontractor List.
  - 2. Contractor Key personnel List
  - 3. Requests for Information (RFI), available from Engineer.
  - 4. Requests for substitution.
  - 5. Shop drawings, product data, and samples.

6. Test and inspection reports.
7. Design data.
8. Manufacturer's instructions and field reports.
9. Applications for payment and change order requests.
10. Progress schedules.
11. Correction Punch List and Final Correction Punch List for Substantial Completion.
12. Closeout submittals.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 ELECTRONIC DOCUMENT SUBMITTAL

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal.
  1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
  2. It is Contractor's responsibility to submit documents in allowable format.
  3. Paper document transmittals will not be reviewed.
  4. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

3.2 PRECONSTRUCTION MEETING

- A. Engineer will schedule a meeting after Notice of Award.
- B. Attendance Required:
  1. Owner.
  2. Engineer.
  3. Contractor.
  4. Suez Water Technologies and Solutions.
- C. Agenda:
  1. Execution of Owner-Contractor Agreement.
  2. Submission of executed bonds and insurance certificates.
  3. Distribution of Contract Documents.
  4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
  5. Installation and Removal of Temporary Facilities and Controls
  6. Submission of initial Submittal schedule.
  7. Designation of key personnel representing the Contractor, City of Buford, Existing Buford Water treatment Plant, and each Subcontractor.
  8. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  9. Scheduling.

- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.3 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

- B. Attendance Required:

- 1. Contractor.
- 2. Owner.
- 3. Engineer.
- 4. Contractor's superintendent.
- 5. Major subcontractors.

- C. Agenda:

- 1. Review minutes of previous meetings.
- 2. Review of work progress.
- 3. Field observations, problems, and decisions.
- 4. Identification of problems that impede, or will impede, planned progress.
- 5. Review of submittals schedule and status of submittals.
- 6. Review of RFIs log and status of responses.
- 7. Review of off-site fabrication and delivery schedules.
- 8. Maintenance of progress schedule.
- 9. Corrective measures to regain projected schedules.
- 10. Planned progress during succeeding work period.
- 11. Maintenance of quality and work standards.
- 12. Effect of proposed changes on progress schedule and coordination.
- 13. Other business relating to work.

- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.4 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 013216

3.5 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

- B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:

- 1. Date.
- 2. High and low temperatures, and general weather conditions.
- 3. List of subcontractors at Project site.
- 4. Approximate count of personnel at Project site.
  - a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
- 5. Major equipment at Project site.
- 6. Material deliveries.
- 7. Safety, environmental, or industrial relations incidents.

8. Meetings and significant decisions.
9. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
10. Change Orders received and implemented.
11. Testing and/or inspections performed.
12. List of verbal instruction given by Owner and/or Engineer.
13. Signature of Contractor's authorized representative.

### 3.6 PROGRESS PHOTOGRAPHS

- A. Refer to section 013233 - Photographic Documentation for progress photograph requirements.
- B. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Engineer.

### 3.7 REQUESTS FOR INFORMATION (RFI)

- A. Definition: A request seeking one of the following:
  1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
  2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  1. Prepare a separate RFI for each specific item.
    - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
  2. Prepare in a format and with content acceptable to Owner.
  3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section - 016000 - Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
  3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
  4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.

- a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Engineer, and any of its consultants, due to processing of such RFIs.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
  - 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  - 2. Owner's, Engineer's, and Contractor's names.
  - 3. Discrete and consecutive RFI number, and descriptive subject/title.
  - 4. Issue date, and requested reply date.
  - 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  - 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  - 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
  - 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
  - 2. Note dates of when each request is made, and when a response is received.
  - 3. Highlight items requiring priority or expedited response.
  - 4. Highlight items for which a timely response has not been received to date.
  - 5. Identify and include improper or frivolous RFIs.
- G. Review Time: Engineer will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
  - 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
  - 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
  - 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
  - 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
  - 4. Notify Engineer within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

### 3.8 SUBMITTAL SCHEDULE

- A. Submit to Engineer for review a schedule for submittals in tabular format.
  - 1. Submit at the same time as the preliminary schedule specified in Section - 013216 - Construction Progress Schedule.
  - 2. Coordinate with Contractor's construction schedule and schedule of values.
  - 3. Format schedule to allow tracking of status of submittals throughout duration of construction.
  - 4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  - 5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

### 3.9 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
- B. Submit to Engineer for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

### 3.10 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
  - 1. Design data.
  - 2. Certificates.
  - 3. Test reports.
  - 4. Inspection reports.
  - 5. Manufacturer's instructions.
  - 6. Manufacturer's field reports.
  - 7. Other types indicated.
- B. Submit for Engineer's knowledge as contract administrator or for Owner.

### 3.11 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
  - 1. Project record documents.
  - 2. Operation and maintenance data.



3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

### 3.12 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples for Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  1. Number of Samples: Submit 3 full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturers product line. Engineer will return submittal with options selected and keep two sets of samples for use in subsequent submittal comparison and coordination.
  2. Retained samples will not be returned to Contractor unless specifically so stated.
- C. Samples for Verification: Submit full-size units for 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 use materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  1. Number of Samples: Submit 3 sets of Samples. Engineer will retain 2 Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record
    - a. 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.
  2. Retained samples will not be returned to Contractor unless specifically so stated.

### 3.13 SUBMITTAL PROCEDURES

- A. General Requirements:
  1. Use a separate transmittal for each item.
  2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
  3. Transmit using approved form.
    - a. Use Contractor's form, subject to prior approval by Engineer.
  4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
  7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.

- a. Send submittals in electronic format via email to Engineer.
- 8. Schedule submittals to expedite the Project, and coordinate submission of related items.
  - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
  - b. For sequential reviews involving Engineer's consultants, Owner, or another affected party, allow an additional 7 days.
  - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Engineer's approval, allow an additional 30 days.
- 9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
- 10. Provide space for Contractor and Engineer review stamps.
- 11. When revised for resubmission, identify all changes made since previous submission.
- 12. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
- 13. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
  - 1. Submit only information required by individual specification sections.
  - 2. Collect required information into a single submittal.
  - 3. Submit concurrently with related shop drawing submittal.
  - 4. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
  - 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  - 2. Do not reproduce Contract Documents to create shop drawings.
  - 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
  - 1. Transmit related items together as single package.
  - 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
  - 3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.
  - 4. 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 not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

### 3.14 SUBMITTAL REVIEW

- A. Submittals for Review: Engineer will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.
- C. Engineer's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Engineer's and consultants' actions on items submitted for review:
1. "Reviewed As Noted": Approved, or language with same legal meaning, no resubmittal required.
    - a. At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
  2. Revise and Resubmit: "Resubmit Corrected Submittal For Review"
    - a. Resubmit revised item, with review notations acknowledged and incorporated.
- E. Engineer's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  2. Items for which action was taken:
    - a. "Reviewed As Noted" - no further action is required from Contractor.

END OF SECTION

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**SECTION 013216 - CONSTRUCTION PROGRESS SCHEDULE**

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

## 1.2 RELATED SECTIONS

- A. General Conditions, Supplementary Conditions apply to this Section as do other Division 01 Specifications Sections.
- B. Section 011000 - Summary: occupancy restrictions and requirements.
- C. Section 012000 - Price and Payment Procedures: Updates to Progress Schedule

## 1.3 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Submit updated schedule with each Application for Payment.
- E. Submit required schedules in the following format:
  - 1. Operable electronic copy of the file.
  - 2. PDF format.

## 1.4 SCHEDULE FORMAT

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- B. Diagram Sheet Size: Maximum 24 x 36 inches (600 x 900 mm).

## 1.5 COORDINATION

- A. The Contractor shall be responsible for the maintenance and coordination of the Construction Schedule, the schedule of values, and the submittal schedule.
  - 1. The Contractor shall provide time commitments for elements of the Work which are critical, and will secure commitments from entities providing these elements.
  - 2. The Contractor will coordinate and schedule construction activities in a proper sequence.

## PART 2 PRODUCTS - Not Used

## PART 3 EXECUTION

## 3.1 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

## 3.2 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Provide sub-schedules for each stage of Work identified in Section 011000 - Summary.

- D. Provide sub-schedules to define critical portions of the entire schedule.
- E. Include conferences and meetings in schedule.
- F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- G. Provide separate schedule of submittal dates for shop drawings, product data, and samples, products identified under Allowances, and dates reviewed submittals will be required from Engineer. Indicate decision dates for selection of finishes.
- H. Coordinate content with schedule of values specified in Section 012000 - Price and Payment Procedures.
- I. Provide legend for symbols and abbreviations used.

### 3.3 BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

### 3.4 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Engineer at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

### 3.5 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.
- G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

### 3.6 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Engineer, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

**SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. All General and Supplementary Conditions apply to this Section.
- B. All Contract drawings and plans apply to this Section.

**1.2 RELATED REQUIREMENTS**

- A. 011000 - Summary
- B. Section 013000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

**1.3 INFORMATIONAL SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Photograph Key: Submit a plan of the Project area and building with notation of photographic vantage points included in submittals. Notation to include photograph direction, corresponding identification number, and story of vantage.
- C. Digital Photographs:
  - 1. Photos shall be submitted weekly.
  - 2. Submit Photos via engineer preferred electronic submission method: Email or file share.
  - 3. Include a copy of the key plan with electronic submissions of photographs.
- D. Provide the following information in reference to each image included in a digital photo log submittal:
  - 1. Name of Project.
  - 2. Name of Engineer.
  - 3. Name of General Contractor and all Subcontractors within photographs.
  - 4. Name and contact information for photographer.
  - 5. Date of photograph.
  - 6. Description of vantage point, including location, direction (by compass point), and elevation or story of construction.
  - 7. Photograph identification number corresponding with Photograph Key.

**1.4 QUALITY ASSURANCE**

- A. Photographer Qualifications: An individual who has been regularly engaged in construction photographic documentation for not less than three years.

**PART 2 PRODUCTS**

**2.1 PHOTOGRAPHIC MEDIA:**

- A. Digital Images: Provide images in JPG format, captured with a digital camera with a minimum sensor size of 12 megapixels at an image resolution not less than 3200 by 2400 pixels. Flash or backlighting shall be used in areas with low lighting conditions.
  - 1. Submit images as originally recorded without digital manipulation, editing or modifications.
- B. Metadata: Record accurate metadata including GPS location, date, and time.
- C. File names: Photographs shall be named to include the following data:
  - 1. Date of capture.

2. Project area.
3. Identification number.

### PART 3 EXECUTION

#### 3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Maintain a photographic key as specified to correspond with each photograph submittal.
- B. Preconstruction Photographs: Before beginning construction activities, take photographs of the Project site and surrounding properties, including existing items to remain during construction, from multiple vantage points.
  1. Flag excavation areas and construction limits prior to capturing preconstruction photographs.
  2. Capture a minimum of 25 photographs documenting the condition of the adjacent properties prior to the start of construction.
  3. Capture a minimum of 25 photographs documenting the condition of existing site structures and construction area.
  4. Capture additional photos as needed to document damage to existing site structures or adjacent properties.
- C. Periodic Construction Photographs: Capture a minimum of 25 photographs to represent the work completed in the time period represented. Periodic construction photographs are to be submitted weekly to the Engineer.
- D. Final Completion Photographs: Capture a minimum of 50 photographs to document the condition of the site following the date of Substantial Completion. Engineer will notify contractor of desired vantage points for photographs.
- E. Engineer Directed Photographs: The Engineer may request photographs be captured in addition to those specified in periodic submittals. In this case, the engineer shall instruct the contractor of desired vantages and/or areas to photograph.

END OF SECTION



**SECTION 013330 - STRUCTURAL SUBMITTALS**

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Structural submittals include shop drawings, design calculations, diagrams, illustrations, schedules, performance charts, nomenclature charts, samples, brochures and other data prepared by the Contractor or any subcontractor, manufacturer, supplier, fabricator, or distributor and which illustrate some portion of the Project.
- B. Submittals by the Contractor are not a part of the Contract Documents.

## 1.2 RELATED SECTIONS

- A. Section 01 33 00 - Submittals

## 1.3 SUBMITTAL PROCEDURES

- A. Prior to the initial submittal, Contractor shall submit to the Design Professional a completed *Submittal Information and Schedules* form given in Appendix I.
- B. Submittals shall be accompanied by a transmittal letter with the following information:
  - 1. Project name.
  - 2. Contractor's name.
  - 3. Date submitted.
  - 4. Description of items submitted; identify work and product by Specification Section.
  - 5. Number of drawings and other pertinent data.
- C. Provide blank space on each submittal for the Design Professional's review stamp.
- D. The type and number of submittals for each item shall be in accordance with Section 013000.
- E. Contractor shall direct specific attention on the submittal to any deviation from the Contract Documents.

## 1.4 CONTRACTOR RESPONSIBILITY

- A. Contractor shall make all submittals in advance of installation or construction to allow the Design Professional sufficient time for review.
- B. Contractor shall stamp and sign each sheet of shop drawings and product data, and sign or initial each sample to certify compliance with requirements of Contract Documents. **SUBMITTALS RECEIVED WITHOUT THE CONTRACTOR'S STAMP OF REVIEW WILL BE RETURNED TO THE CONTRACTOR FOR REVIEW AND RESUBMITTAL.**
- C. Contractor shall understand that the submittal of the required documents does not constitute compliance with the requirements of the Contract Documents; only submittals reviewed by the Design Professional constitute compliance.
- D. It is the Contractor's responsibility to furnish equipment, materials, and labor for the Project which meets the requirements of the codes and authorities quoted as well as the

Contract Documents. Proprietary items specified herein only establish a minimum functional and aesthetic standard and it is incumbent upon the Contractor to ascertain conformance of these proprietary items or any proposed substitution with the codes and authorities.

- E. By reviewing, approving and submitting shop drawings, product data, or samples, Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, member sizes catalog numbers, and similar data and that he has checked and coordinated shop drawings with the requirements of the Project and of the Contract Documents.
- F. Work requiring shop drawings, whether called for by the Contract Documents or requested by the Contractor, shall not commence until the submission has been reviewed by the Design Professional. Work may commence if the Contractor verifies the accuracy of the Design Professional's corrections and notations and complies with them without exception and without requesting change in Contract Sum or Contract Time.

#### 1.5 DESIGN PROFESSIONAL REVIEW

- A. Design Professional will review submittals with reasonable promptness.
- B. Design Professional's review or corrections refer only to the general arrangement and conformance of the subject of the submittals with the design concept of the project and with the information given in the Contract Documents. Under no conditions should the Contractor consider the review to include the dimensions, quantities, and details of the items nor the approval of an assembly in which the item functions.
- C. Design Professional's review shall not relieve the Contractor from responsibility for errors or omissions in the submittals.
- D. Design Professional's review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has directed specific attention to the deviation at the time of submission and the Design Professional has given written approval to the specific deviation.
- E. Design Professional's review of submittals shall not be construed as authorizing any change in the Contract Sum or Contract Time.

#### 1.6 SHOP DRAWINGS

- A. Present in a clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail of Contract Documents.
- B. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.
- C. Identify field dimensions; show relationship to adjacent or critical features of Work or products.
- D. A copy of the marked structural shop drawings with the Design Professional's review stamp is to be maintained at the job site.

#### 1.7 PRODUCT DATA

- A. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
- B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information which is not applicable.
- C. Provide manufacturer's preparation, assembly, and installation instructions.

1.8 SAMPLES

- A. Submit full range of manufacturer's standard finishes except where more restrictive requirements are specified, indicating colors, textures, and patterns.
- B. Submit samples to illustrate functional characteristics of products, including parts and attachments as required by Design Professional.
- C. Approved samples which are of proper size may be incorporated in Work.
- D. Label each sample with identification.
- E. Field Finishes: Provide full samples at Project, at location acceptable to Design Professional, as required by individual Specification Section. Install each sample complete and finished. Acceptable finishes in place may be retained in completed work.

1.9 RESUBMITTALS

- A. When submittals are returned to the Contractor with the Design Professional's corrections the Contractor shall make the required corrections. Upon request, resubmit one corrected set.
- B. Contractor shall direct specific attention on the resubmittal to all revisions including those requested by the Design Professional on previous submission.

1.10 DISTRIBUTION

- A. Distribute reproductions of shop drawings, copies of product data, and samples which bear the Design Professional's review stamp to job site file, Record Documents file, subcontractors, suppliers, other affected contractors, and other entities requiring information.
- B. Work shall be in accordance with and performed from the reviewed drawings.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

APPENDIX I  
SUBMITTAL INFORMATION AND SCHEDULES

PROJECT \_\_\_\_\_

CONTRACTOR \_\_\_\_\_

CONTRACTOR'S ADDRESS \_\_\_\_\_

\_\_\_\_\_

PROJ. MANAGER \_\_\_\_\_ PHONE (\_\_\_\_) \_\_\_\_\_ FAX (\_\_\_\_) \_\_\_\_\_

SUPERINTENDENT \_\_\_\_\_ PHONE (\_\_\_\_) \_\_\_\_\_ FAX (\_\_\_\_) \_\_\_\_\_

MOBILIZATION DATE \_\_\_\_\_

PROJECTED SUBMITTAL DATES

FOUNDATION, CONCRETE & REINFORCING		STRUCTURAL STEEL		MASONRY	
SUBMITTAL	DATE	SUBMITTAL	DATE	SUBMITTAL	DATE
Site Preparation & Equipment Information		Fabricator / Erector Qualifications		Grout & Mortar Mix	
Concrete Mix Design		Anchor Bolt & Embedded Items		Block Prism & Comp. Strength	
Foundation Reinforcing		Erection & Detail Drawings		Reinforcing	
Structural Frame Reinforcing				Written Procedures	
Miscellaneous Frame Reinforcing					
				WOOD	DATE
Precast		Stair Drawings			

Remarks:

COMPLETED BY \_\_\_\_\_ DATE \_\_\_\_\_

END OF APPENDIX I

**SECTION 014000 - QUALITY REQUIREMENTS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and Inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Control of installation.
- G. Mock-ups.
- H. Tolerances.
- I. Manufacturers' field services.
- J. Defect Assessment.

**1.2 RELATED REQUIREMENTS**

- A. Section 012100 - Allowances: Allowance for payment of testing services.
- B. Section 013000 - Administrative Requirements: Submittal procedures.
- C. Section 016000 - Product Requirements: Requirements for material and product quality.

**1.3 REFERENCE STANDARDS**

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation 2017.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry 2019.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2020.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2015.
- G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components 2016.
- H. IAS AC89 - Accreditation Criteria for Testing Laboratories 2018.

**1.4 DEFINITIONS**

- A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
- B. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.
- C. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- D. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- E. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
    - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
  - F. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
    - 1. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on- site as freestanding temporary built elements, consisting of multiple products, assemblies, and subassemblies, with cutaways enabling inspection of concealed portions of the Work.
      - a. Include each system, assembly, component, and part of the exterior wall to be constructed for the Project. Colors of components shall be those selected by the Engineer/Architect for use in the Project.
    - 2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
    - 3. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
    - 4. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
  - G. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
  - H. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
  - I. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
  - J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall have the same meaning as testing agency.
  - K. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
  - L. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality- control services do not include contract administration activities performed by Engineer/Architect or Program Manager.
- 1.5 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES
- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
  - B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:

1. Temporary sheeting, shoring, or supports.
2. Temporary scaffolding.
3. Temporary bracing.
4. Temporary stairs or steps required for construction access only.
5. Temporary hoist(s) and rigging.

1.6 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
  1. Concrete Mix Design: As described in Section 033000 - Cast-in-Place Concrete. No specific designer qualifications are required.
  2. Structural Design of Metal Fabrications: As described in Section 055000 - Metal Fabrications.
  3. Written Sequence of Operation: Include entire HVAC system and each piece of equipment, as described in Section 230993 - Sequence of Operations for HVAC Controls.
  4. Design of Seismic Component of Structural Supports and Anchors: As described in Section 460509 - Piping and Equipment Supports and Anchors.
  5. Design Standard for Water Storage Tank [Elevated, Composite, Ground Storage, Prestressed Concrete] - AWWA D110.

1.7 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Engineer/Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Engineer/Architect for clarification before proceeding. See also notes on the title sheet of the contract drawings.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer/Architect for a decision before proceeding.

1.8 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Designer's Qualification Statement: Submit for Engineer/Architect's knowledge as contract administrator, or for Owner's information.
  1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
    - a. Full name.
    - b. Professional licensure information.
    - c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.
- C. Design Data: Submit for Engineer/Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
  2. Include required product data and shop drawings.
  3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
  4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
- D. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer/Architect and to Contractor.
1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Compliance with Contract Documents.
    - k. When requested by Engineer/Architect, provide interpretation of results.
  2. Test report submittals are for Engineer/Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, and for Owner's information.
- E. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
  2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- F. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.
- H. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Engineer/Architect, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- I. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or



installation.

- J. Manufacturer's Field Reports: Submit reports for Engineer/Architect's benefit as contract administrator and for Owner.
  - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
- K. Erection Drawings: Submit drawings for Engineer/Architect's benefit as contract administrator and for Owner.
  - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

#### 1.9 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
  - 1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer/Architect and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer/Architect experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Contractor's Quality Control (CQC) Plan:
  - 1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
    - a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
    - b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
      - 1) Management and control of documents and records relating to quality.
      - 2) Communications.
      - 3) Coordination procedures.
      - 4) Inspection and testing procedures and scheduling.
      - 5) Control of testing and measuring equipment.
      - 6) Project materials certification.
    - c. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.
    - d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require Contractor to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.
- D. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

#### 1.10 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are

- required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
  - C. Obtain copies of standards where required by product specification sections.
  - D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
  - E. Should specified reference standards conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
  - F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Engineer/Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

#### 1.11 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Contractor shall employ and pay for services of an independent testing agency to perform testing and inspection services that are listed on the Section 014525 Schedule of Special Inspection Services, code mandated, or indicated as the Owner's responsibility. Payment for cost of these services will be made from the testing and inspection allowance specified in Section 012100, as authorized and directed by the Owner or Engineer/Architect. See Section 012100 and other applicable sections for description of services included in the allowance.
- B. Tests and inspections not specifically assigned to Owner or code mandated are Contractor's responsibility. Perform additional testing and inspections activities, whether specified or not, to verify that the work complies with requirements. Engage a qualified testing agency to perform testing and inspection activities and include cost for such services in the Contract Sum. Such cost is not to be included in the testing and inspection allowance.
- C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- D. Contractor Employed Agency:
  - 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
  - 2. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

#### PART 2 PRODUCTS - Not Used

#### PART 3 EXECUTION

##### 3.1 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

### 3.2 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Engineer/Architect will use to judge the Work.
- C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.
- D. Room Mock-ups: Construct room mock-ups as indicated on drawings. Coordinate installation of materials, products, and assemblies as required in specification sections; finish according to requirements. Provide required lighting and any supplemental lighting where required to enable Engineer/Architect to evaluate quality of the mock-up.
- E. Notify Engineer/Architect fifteen (15) working days in advance of dates and times when mock-ups will be constructed.
- F. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- G. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- H. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- I. Obtain Engineer/Architect's approval of mock-ups before starting work, fabrication, or construction.
  - 1. Engineer/Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
  - 2. Make corrections as necessary until Engineer/Architect's approval is issued.
- J. Engineer/Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- K. Where mock-up has been accepted by Engineer/Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Engineer/Architect.
- L. Where possible salvage and recycle the demolished mock-up materials.

### 3.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

### 3.4 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Engineer/Architect and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.

4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  5. Promptly notify Engineer/Architect and Contractor of observed irregularities or non-compliance of Work or products.
  6. Perform additional tests and inspections required by Engineer/Architect.
  7. Submit reports of all tests/inspections specified. Content of tests/reports shall include the following:
    - a. Date of Report release.
    - b. Project title and number.
    - c. Testing Agency's Name, address, telephone number, and email address.
    - d. Dates and locations of samples, tests or inspections.
    - e. Names of individual(s) conducting tests and inspections.
    - f. Description of the Work and test and inspection method.
    - g. Identification of product and Specification Section.
    - h. Complete test or inspection data.
    - i. Test and inspection results and an interpretation of test results.
    - j. Atmospheric Conditions recorded at time of sample-taking and testing and inspection.
    - k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
    - l. Name and signature of laboratory inspector.
    - m. Recommendations on retesting and reinspecting.
- C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the Work.
  3. Agency may not assume any duties of Contractor.
  4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Engineer/Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer/Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.5 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.6 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Engineer/Architect, it is not practical to remove and replace the work, Engineer/Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

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**SECTION 014219 - REFERENCE STANDARDS**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Project Drawings
- B. General Provisions of the Contract, including:
  - 1. General Conditions
  - 2. Supplementary Conditions
  - 3. Division 01 Specification Sections

**1.2 DEFINITIONS**

- A. General: See Conditions of the Contract for basic Contract definitions.
- B. Project Site: The area available to perform construction activities, as shown on Drawings.
- C. Furnish: Produce and deliver to the Project Site, ready for assembly and installation.
- D. Install: Assemble, erect, anchor, place, apply, connect and similar actions.
- E. Provide: Furnish and install for intended use.
- F. Regulations: Rules and agreements in the construction industry that dictate the performance of the Work, and laws, statutes, and ordinances issued by authorities having jurisdiction.

**1.3 INDUSTRY STANDARDS**

- A. General: All entities involved in the Project are to be familiar with industry standards related to construction activities. Abide by standards in effect as of the date of Contract Documents. Copies of related standards are not bound in the Contract Documents; however, industry standards have the same force and effect as if they were.

**1.4 ABBREVIATIONS AND ACRONYMS**

- A. Industry Organizations: Abbreviations and acronyms in Contract Documents shall mean the name of the entities in Part 2 and Part 3 of this Section. Abbreviations and acronyms not in this list shall refer to the name of entities indicated in Gale's "Encyclopedia of Associations: Name Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

**PART 2 CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS**

- 2.1 AABC -- ASSOCIATED AIR BALANCE COUNCIL
- 2.2 AAMA -- AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION
- 2.3 AASHTO -- AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
- 2.4 AATCC -- AMERICAN ASSOCIATION OF TEXTILE CHEMISTS & COLORISTS
- 2.5 ABMA -- AMERICAN BEARING MANUFACTURERS ASSOCIATION, INC.
- 2.6 ACG -- AABC COMMISSIONING GROUP
- 2.7 ACI -- AMERICAN CONCRETE INSTITUTE INTERNATIONAL
- 2.8 AEIC -- ASSOCIATION OF EDISON ILLUMINATING COMPANIES
- 2.9 AFPA -- AMERICAN FOREST AND PAPER ASSOCIATION
- 2.10 AGA -- AMERICAN GALVANIZERS ASSOCIATION, INC.

- 2.11 AGC -- ASSOCIATED GENERAL CONTRACTORS OF AMERICA
- 2.12 AHA -- AMERICAN HARDBOARD ASSOCIATION
- 2.13 AHAM -- ASSOCIATION OF HOME APPLIANCE MANUFACTURERS:
- 2.14 AHRI -- AIR-CONDITIONING, HEATING, AND REFRIGERATION INSTITUTE
- 2.15 AI -- THE ASPHALT INSTITUTE
- 2.16 AIA -- THE AMERICAN INSTITUTE OF ARCHITECTS
- 2.17 AIST -- ASSOCIATION FOR IRON AND STEEL TECHNOLOGY
- 2.18 AITC -- AMERICAN INSTITUTE OF TIMBER CONSTRUCTION
- 2.19 ALI -- AMERICAN LADDER INSTITUTE
- 2.20 AMCA -- AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.
- 2.21 ANSI -- AMERICAN NATIONAL STANDARDS INSTITUTE
- 2.22 AOSA -- ASSOCIATION OF OFFICIAL SEED ANALYSTS
- 2.23 APA -- APA - THE ENGINEERED WOOD ASSOCIATION
- 2.24 API -- AMERICAN PETROLEUM INSTITUTE
- 2.25 API -- ALLIANCE FOR THE POLYURETHANES INDUSTRY, AMERICAN PLASTICS COUNCIL
- 2.26 ARI -- AIR-CONDITIONING AND REFRIGERATION INSTITUTE (SEE AHRI)
- 2.27 ARPM - ASSOCIATION FOR RUBBER PRODUCTS MANUFACTURERS
- 2.28 ARRA -- ASPHALT RECYCLING AND RECLAIMING ASSOCIATION
- 2.29 ASA -- ACOUSTICAL SOCIETY OF AMERICA
- 2.30 ASCA -- ARCHITECTURAL SPRAY COATERS ASSOCIATION
- 2.31 ASCE -- AMERICAN SOCIETY OF CIVIL ENGINEERS
- 2.32 ASHRAE -- AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
- 2.33 ASME -- THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
- 2.34 ASPA -- AMERICAN SOD PRODUCERS ASSOCIATION (SEE TURFGRASS PRODUCERS INTERNATIONAL)
- 2.35 ASSE -- AMERICAN SOCIETY OF SANITARY ENGINEERING
- 2.36 ASTM A SERIES -- ASTM INTERNATIONAL
  - A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
  - B. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2020.
- 2.37 ASTM B SERIES -- ASTM INTERNATIONAL
  - A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2014.
- 2.38 ASTM C SERIES -- ASTM INTERNATIONAL
- 2.39 ASTM D SERIES -- ASTM INTERNATIONAL
- 2.40 ASTM E SERIES -- ASTM INTERNATIONAL



- 2.41 ASTM F SERIES -- ASTM INTERNATIONAL
- 2.42 ASTM G SERIES -- ASTM INTERNATIONAL
- 2.43 ASTM SYMPOSIA AND SELECTED TECHNICAL PAPERS -- ASTM INTERNATIONAL
- 2.44 AWC -- AMERICAN WOOD COUNCIL
- 2.45 AWCI -- ASSOCIATION OF THE WALL AND CEILING INDUSTRIES INTERNATIONAL
- 2.46 AWI -- ARCHITECTURAL WOODWORK INSTITUTE
- 2.47 AWI/AWMAC/WI -- JOINT PUBLICATION OF ARCHITECTURAL WOODWORK INSTITUTE/ARCHITECTURAL WOODWORK MANUFACTURERS ASSOCIATION OF CANADA/WOODWORK INSTITUTE
- 2.48 AWMAC -- ARCHITECTURAL WOODWORK MANUFACTURERS ASSOCIATION OF CANADA
- 2.49 AWMAC/WI -- JOINT PUBLICATION OF ARCHITECTURAL WOODWORK MANUFACTURERS ASSOCIATION OF CANADA/WOODWORK INSTITUTE
- 2.50 AWPA -- AMERICAN WOOD-PRESERVERS' ASSOCIATION
- 2.51 AWPB -- AMERICAN WOOD PRESERVERS BUREAU
- 2.52 AWS -- AMERICAN WELDING SOCIETY
- 2.53 AWWA -- AMERICAN WATER WORKS ASSOCIATION
- 2.54 BHMA -- BUILDERS HARDWARE MANUFACTURERS ASSOCIATION
- 2.55 BIA -- BRICK INDUSTRY ASSOCIATION
- 2.56 BICSI -- BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL
- 2.57 BIFMA -- BUSINESS AND INSTITUTIONAL FURNITURE MANUFACTURERS ASSOCIATION
- 2.58 BOMA -- BUILDING OWNERS AND MANAGERS ASSOCIATION
- 2.59 CABO -- COUNCIL OF AMERICAN BUILDING OFFICIALS:
- 2.60 CAGI -- COMPRESSED AIR AND GAS INSTITUTE
- 2.61 CBMA -- CERTIFIED BALLAST MANUFACTURERS ASSOCIATION
- 2.62 CDA -- COPPER DEVELOPMENT ASSOCIATION, INC.
- 2.63 CFSEI - COLD-FORMED STEEL ENGINEERS INSTITUTE
- 2.64 CGA -- COMPRESSED GAS ASSOCIATION
- 2.65 CISCA -- CEILINGS & INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION
- 2.66 CISPI -- CAST IRON SOIL PIPE INSTITUTE
- 2.67 CLFMI -- CHAIN LINK FENCE MANUFACTURERS INSTITUTE
- 2.68 CPA -- COMPOSITE PANEL ASSOCIATION
- 2.69 CRI -- CARPET AND RUG INSTITUTE
- 2.70 CRRC -- COOL ROOF RATING COUNCIL
- 2.71 CRSI -- CONCRETE REINFORCING STEEL INSTITUTE
- 2.72 CSSB -- CEDAR SHAKE AND SHINGLE BUREAU
- 2.73 CTI -- CERAMIC TILE INSTITUTE
- 2.74 CTI -- COOLING TECHNOLOGY INSTITUTE
- 2.75 DASMA -- DOOR & ACCESS SYSTEMS MANUFACTURERS' ASSOCIATION, INTERNATIONAL

- 2.76 DBIA -- THE DESIGN BUILD INSTITUTE OF AMERICA, INC.
- 2.77 DFI -- DEEP FOUNDATION INSTITUTE
- 2.78 DHI -- DOOR AND HARDWARE INSTITUTE
- 2.79 DIPRA - DUCTILE IRON PIPE RESEARCH ASSOCIATION
- 2.80 EIA -- ELECTRONIC INDUSTRIES ALLIANCE
- 2.81 EIA -- ENVIRONMENTAL INDUSTRY ASSOCIATION
- 2.82 EIMA -- EXTERIOR INSULATION MANUFACTURERS ASSOCIATION
- 2.83 EJCDC -- ENGINEERS' JOINT CONTRACT DOCUMENTS COMMITTEE
- 2.84 EJMA -- EXPANSION JOINT MANUFACTURERS ASSOCIATION
- 2.85 ETG -- ETHERCAT TECHNOLOGY GROUP
- 2.86 ETL -- ETL TESTING LABORATORY
- 2.87 FIELDCOMM GROUP (FFTS) - FOUNDATION FIELDBUS TECHNICAL SPECIFICATIONS;2014.
- 2.88 FM -- FACTORY MUTUAL GLOBAL
- 2.89 GA -- GYPSUM ASSOCIATION
- 2.90 GANA -- GLASS ASSOCIATION OF NORTH AMERICA
- 2.91 GEI -- GREENGUARD ENVIRONMENTAL INSTITUTE
- 2.92 GREEN GLOBES -- GREEN BUILDING INITIATIVE
- 2.93 GREENSEAL -- GREENSEAL, INC.
- 2.94 GREENSCREEN -- CLEAN PRODUCTION ACTION
- 2.95 GRI -- GEOSYNTHETIC RESEARCH INSTITUTE
- 2.96 HI -- HYDRAULIC INSTITUTE
- 2.97 HI -- THE HYDRONICS INSTITUTE (SEE AHRI)
- 2.98 HPVA -- HARDWOOD PLYWOOD VENEER ASSOCIATION
- 2.99 HPW -- H.P. WHITE LABORATORY, INC.
- 2.100 IAPMO -- INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS
- 2.101 IAS -- INTERNATIONAL ACCREDITATION SERVICE
- 2.102 ICBO -- INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS
- 2.103 ICBO-ES -- ICBO EVALUATION SERVICE, INC.
- 2.104 ICC -- INTERNATIONAL CODE COUNCIL, INC.
- 2.105 ICC-ES -- ICC EVALUATION SERVICE, INC.
- 2.106 ICEA -- INSULATED CABLE ENGINEERS ASSOCIATION
- 2.107 ICRI -- INTERNATIONAL CONCRETE REPAIR INSTITUTE
- 2.108 IEC -- INTERNATIONAL ELECTROTECHNICAL COMMISSION
- 2.109 IEEE -- INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
- 2.110 IES/IESNA -- ILLUMINATING ENGINEERING SOCIETY
- 2.111 IETF -- INTERNET ENGINEERING TASK FORCE
- 2.112 IGMA -- INSULATING GLASS MANUFACTURERS ALLIANCE

- 2.113 IGSHPA -- INTERNATIONAL GROUND SOURCE HEAT PUMP ASSOCIATION
- 2.114 ILI -- INDIANA LIMESTONE INSTITUTE OF AMERICA, INC.
- 2.115 IMIAWC -- INTERNATIONAL MASONRY INDUSTRY ALL-WEATHER COUNCIL
- 2.116 ISDI -- INSULATED STEEL DOOR INSTITUTE
- 2.117 ISFA - INTERNATIONAL SURFACE FABRICATORS ASSOCIATION
- 2.118 ISS -- IRON AND STEEL SOCIETY
- 2.119 ISSFA - INTERNATIONAL SOLID SURFACE FABRICATORS ASSOCIATION
- 2.120 ISO -- INTERNATIONAL STANDARDS ORGANIZATION
- 2.121 ITS -- INTERTEK TESTING SERVICES NA, INC.
- 2.122 IWBI -- INTERNATIONAL WELL BUILDING INSTITUTE
- 2.123 KCMA -- KITCHEN CABINET MANUFACTURERS ASSOCIATION
- 2.124 LIA -- LEAD INDUSTRIES ASSOCIATION, INC.
- 2.125 LONMARK -- LONMARK INTERNATIONAL
- 2.126 LPI -- LIGHTNING PROTECTION INSTITUTE
- 2.127 MBMA -- METAL BUILDING MANUFACTURERS ASSOCIATION
- 2.128 M-H -- MCGRAW-HILL BOOK COMPANY
- 2.129 MFMA -- MAPLE FLOORING MANUFACTURERS ASSOCIATION
- 2.130 MFMA -- METAL FRAMING MANUFACTURERS ASSOCIATION
- 2.131 MICROSOFT DOCS - MICROSOFT TECHNICAL DOCUMENTATION;CURRENT EDITION.
- 2.132 ML/SFA -- METAL LATH/STEEL FRAMING ASSOCIATION - SEE NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS
- 2.133 MPI -- MASTER PAINTERS INSTITUTE (MASTER PAINTERS AND DECORATORS ASSOCIATION)
- 2.134 MMSA -- MATERIALS AND METHODS STANDARDS ASSOCIATION
- 2.135 MSS -- MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC.
- 2.136 NAA -- NATIONAL ARBORIST ASSOCIATION
- 2.137 NAAMM -- THE NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS
- 2.138 NACE -- NACE INTERNATIONAL
- 2.139 NADCA -- NATIONAL AIR DUCT CLEANING ASSOCIATION
- 2.140 NAGDM -- NATIONAL ASSOCIATION OF GARAGE DOOR MANUFACTURERS
- 2.141 NAMM -- NATIONAL ASSOCIATION OF MIRROR MANUFACTURERS
- 2.142 NASSPA -- NORTH AMERICAN STEEL SHEET PILE ASSOCIATION
- 2.143 NBBI -- THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS
- 2.144 NBGQA -- NATIONAL BUILDING GRANITE QUARRIES ASSOCIATION, INC.
- 2.145 NBI -- NEW BUILDINGS INSTITUTE
- 2.146 NCMA -- NATIONAL CONCRETE MASONRY ASSOCIATION
- 2.147 NCWPB - NATIONAL CERTIFIED PIPE WELDING BUREAU

- 2.148 NEBB -- NATIONAL ENVIRONMENTAL BALANCING BUREAU
- 2.149 NECA -- NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION
- 2.150 NEII -- NATIONAL ELEVATOR INDUSTRY, INC.
- 2.151 NELMA -- NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION, INC.
- 2.152 NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
- 2.153 NETA -- INTERNATIONAL ELECTRICAL TESTING ASSOCIATION
- 2.154 NFHS -- NATIONAL FEDERATION OF STATE HIGH SCHOOL ASSOCIATIONS:
- 2.155 NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION
- 2.156 NFRC -- NATIONAL FENESTRATION RATING COUNCIL, INC.
- 2.157 NHLA -- NATIONAL HARDWOOD LUMBER ASSOCIATION
- 2.158 NIBS -- NATIONAL INSTITUTE OF BUILDING SCIENCES
- 2.159 NIST -- NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (U.S. DEPARTMENT OF COMMERCE)
- 2.160 NLA -- NATIONAL LIME ASSOCIATION
- 2.161 NLGA -- NATIONAL LUMBER GRADES AUTHORITY (CANADA)
- 2.162 NOFMA -- NATIONAL OAK FLOORING MANUFACTURERS ASSOCIATION
- 2.163 NPCA -- NATIONAL PAINT AND COATINGS ASSOCIATION
- 2.164 NRCA -- NATIONAL ROOFING CONTRACTORS ASSOCIATION
- 2.165 NSF -- NSF INTERNATIONAL (THE PUBLIC HEALTH AND SAFETY ORGANIZATION)
- 2.166 NSI -- NATURAL STONE INSTITUTE
- 2.167 NSSA - NATIONAL STORM SHELTER ASSOCIATION
- 2.168 NSWMA -- NATIONAL SOLID WASTES MANAGEMENT ASSOCIATION
- 2.169 NTMA -- NATIONAL TERRAZZO AND MOSAIC ASSOCIATION, INC., THE
- 2.170 NTMA -- NATIONAL TILE AND MARBLE ASSOCIATION
- 2.171 NWFA -- NATIONAL WOOD FLOORING ASSOCIATION
- 2.172 NWWDA -- NATIONAL WOOD WINDOW AND DOOR ASSOCIATION (NAME CHANGED TO WDMA)
- 2.173 OWMA -- OPERABLE WALL MANUFACTURERS ASSOCIATION
- 2.174 PCA -- PORTLAND CEMENT ASSOCIATION
- 2.175 PCI -- PRECAST/PRESTRESSED CONCRETE INSTITUTE
- 2.176 PDCA -- PAINTING AND DECORATING CONTRACTORS OF AMERICA
- 2.177 PDI -- PLUMBING AND DRAINAGE INSTITUTE
- 2.178 PHCC -- PLUMBING HEATING COOLING CONTRACTORS ASSOCIATION
- 2.179 PTI -- POST-TENSIONING INSTITUTE
- 2.180 RCSC -- RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS
- 2.181 RIS -- REDWOOD INSPECTION SERVICE
- 2.182 RFCI -- RESILIENT FLOOR COVERING INSTITUTE
- 2.183 RTI - ROOF TILE INSTITUTE

- 2.184 SAE -- SAE INTERNATIONAL
- 2.185 SBCCI -- SOUTHERN BUILDING CODE CONGRESS INTERNATIONAL, INC.
- 2.186 SCAQMD -- SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
- 2.187 SCMA -- SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION
- 2.188 SCS - SCIENTIFIC CERTIFICATION SYSTEMS
- 2.189 SCTE -- SOCIETY OF CABLE TELECOMMUNICATIONS ENGINEERS
- 2.190 SDI -- STEEL DECK INSTITUTE
- 2.191 SDI -- STEEL DOOR INSTITUTE
- 2.192 SEFA -- SCIENTIFIC EQUIPMENT AND FURNITURE ASSOCIATION
- 2.193 SIGMA -- SEALED INSULATING GLASS MANUFACTURERS ASSOCIATION (SEE IGMA)
- 2.194 SJI -- STEEL JOIST INSTITUTE
- 2.195 SMA -- SCREEN MANUFACTURERS ASSOCIATION
- 2.196 SMA -- STUCCO MANUFACTURERS ASSOCIATION, INC.
- 2.197 SMACNA -- SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC.
- 2.198 SPIB -- SOUTHERN PINE INSPECTION BUREAU, INC.
- 2.199 SPRI -- SINGLE PLY ROOFING INDUSTRY
- 2.200 SRI -- STEEL RECYCLING INSTITUTE
- 2.201 SSPC -- SOCIETY FOR PROTECTIVE COATINGS
- 2.202 STI -- STEEL TANK INSTITUTE
- 2.203 SWI -- STEEL WINDOW INSTITUTE
- 2.204 SWRI -- SEALANT, WATERPROOFING AND RESTORATION INSTITUTE
- 2.205 TCNA -- TILE COUNCIL OF NORTH AMERICA, INC.
- 2.206 TIA -- TELECOMMUNICATIONS INDUSTRY ASSOCIATION
- 2.207 TIMA -- TIMA
- 2.208 TMS -- THE MASONRY SOCIETY
- 2.209 TPI -- TRUSS PLATE INSTITUTE
- 2.210 TPI -- TURFGRASS PRODUCERS INTERNATIONAL
- 2.211 UL -- UNDERWRITERS LABORATORIES INC.
  - A. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems  
Current Edition, Including All Revisions.
- 2.212 USGBC -- U.S. GREEN BUILDING COUNCIL
- 2.213 VSI -- VINYL SIDING INSTITUTE, A DIVISION OF THE SOCIETY OF THE PLASTICS INDUSTRY, INC.
- 2.214 WCMA -- WINDOW COVERING MANUFACTURERS ASSOCIATION
- 2.215 WDMA -- WINDOW AND DOOR MANUFACTURERS ASSOCIATION (FORMERLY NWWDA)
- 2.216 WI -- WOODWORK INSTITUTE
- 2.217 WMMPA -- WOOD MOULDING AND MILLWORK PRODUCERS ASSOCIATION

2.218 WRCLA -- WESTERN RED CEDAR LUMBER ASSOCIATION

2.219 WWPA -- WESTERN WOOD PRODUCTS ASSOCIATION

PART 3 UNITED STATES GOVERNMENT AND RELATED AGENCIES DOCUMENTS

3.1 ATBCB -- US ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD  
(THE ACCESS BOARD)

3.2 CFR -- CODE OF FEDERAL REGULATIONS

3.3 COE -- CORPS OF ENGINEERS, U.S. ARMY

3.4 CPSC -- CONSUMER PRODUCTS SAFETY COMMISSION

3.5 DOS -- UNITED STATES DEPARTMENT OF STATE

3.6 EPA -- ENVIRONMENTAL PROTECTION AGENCY

3.7 FEMA -- U.S. FEDERAL EMERGENCY MANAGEMENT AGENCY

3.8 FHWA -- FEDERAL HIGHWAY ADMINISTRATION

3.9 FS -- FEDERAL SPECIFICATIONS AND STANDARDS (GENERAL SERVICES  
ADMINISTRATION)

3.10 GSA -- U.S. GENERAL SERVICES ADMINISTRATION

3.11 MIL -- MILITARY SPECIFICATIONS AND STANDARDS

3.12 NASEM -- NATIONAL ACADEMIES OF SCIENCE, ENGINEERING, AND MEDICINE

3.13 NPS -- NATIONAL PARK SERVICE (DEPT. OF THE INTERIOR)

3.14 NSA -- NATIONAL SECURITY AGENCY

3.15 PS -- PRODUCT STANDARDS

3.16 USAB -- UNITED STATES ACCESS BOARD

3.17 USC -- UNITED STATES CODE

3.18 USDA -- UNITED STATES DEPARTMENT OF AGRICULTURE

3.19 USDHUD -- UNITED STATES DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

3.20 USGS -- UNITED STATES GEOLOGICAL SURVEY

END OF SECTION

**SECTION 014525 - STRUCTURAL TESTING/INSPECTION AGENCY SERVICES**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section summarizes the responsibility of the Contractor and the Structural Testing/Inspection Agency in the performance of the testing/inspection specified in the Contract Documents.
- B. Neither the observation of the Design Professional in the administration of the contract, nor tests/inspections by the Testing/Inspection Agency, nor approvals by persons other than the Design Professional shall relieve the Contractor from his obligation to perform the work in accordance with the Contract Documents.

1.2 RELATED SECTIONS

- A. Section 013330 - Structural Submittals.
- B. Section 014000 - Quality Control Services.

1.3 REFERENCES

- A. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- B. ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.
- C. American Council of Independent Laboratories - Recommended Requirements for Independent Laboratories Qualifications.

1.4 SELECTION AND PAYMENT

- A. Contractor will employ and pay for services of an independent testing and inspection agency to perform testing and inspection services that are listed on the Section 014525 Schedule of Special Inspections Services, code mandated or indicated as the Owner's responsibility. Payment for cost of these services shall be made from the testing and inspection allowance specified in Section 012100, as authorized and directed by the Owner or Engineer.
- B. Contractor shall pay for any additional structural testing/inspection required for work or materials not complying with Contract Documents due to negligence or nonconformance.
- C. Contractor shall pay for any additional structural testing/inspection required for his convenience.
- D. Qualifications: Minimum Special Inspector qualifications shall be per Table 1704.2 of 2020 Georgia State Amendments to the International Building Code (2018 Edition).

1.5 STRUCTURAL TESTING/INSPECTION REQUIREMENT SUMMARY

- A. Specific structural testing/inspection requirements are given in the following specification sections:

Specification 03 1000	-	Concrete Formwork Inspection
Specification 03 2000	-	Concrete Reinforcement Inspection
Specification 03 3000	-	Concrete Testing/Inspection
Specification 03 4100	-	Precast Installation Inspection
Specification 03 6200	-	Non-Shrink Grout Inspection
Specification 04 2200	-	Masonry Testing/Inspection
Specification 05 1000	-	Structural Steel Inspection
Specification 31 2323	-	Fill

1.6 STATEMENT OF SPECIAL INSPECTIONS

- A. Provide testing/inspection required to meet the provisions of the Schedule of Special Inspection Services below.

PART 2 MATERIALS

Not Used.

PART 3 EXECUTION

3.1 STRUCTURAL PRECONSTRUCTION MEETING

- A. A structural preconstruction meeting may be conducted at the construction site by the Design Professional to discuss quality issues. The parties involved may be the Design Professional, Contractor, Structural Testing/Inspection Agency, appropriate subcontractors, suppliers, and detailers.

3.2 STRUCTURAL TESTING/INSPECTION AGENCY'S RESPONSIBILITIES

- A. Cooperate with the Contractor and provide timely service.
- B. Upon arriving at the construction site, sign in and notify the Contractor of presence.
- C. Select the representative samples that are to be tested/ inspected.
- D. Perform tests/ inspections as outlined in Contract Documents, the applicable codes, and as directed by the Design Professional.
- E. Report work and materials not complying with Contract Documents immediately to the Contractor and Design Professional.
- F. Leave copies of field notes with the Contractor prior to leaving the construction site. Field notes shall include the message given to the Contractor, date, time of message, name of Contractor's representative informed, type and location of work or materials tested/inspected, whether the work or materials complies with Contract Documents and name of the Structural Testing/Inspection Agency's representative.
- G. Report and distribute results of tests/inspections promptly in the form of written reports as directed by the Design Professional.
- H. Structural Testing/Inspection Agency shall not alter requirements of Contract Documents, approve or reject any portion of the work, or perform duties of the Contractor.



### 3.3 CONTRACTOR'S RESPONSIBILITIES

- A. Provide copy of Contract Documents to the Structural Testing/Inspection Agency.
- B. Arrange the preconstruction meeting to discuss quality issues.
- C. Notify the Structural Testing/Inspection Agency sufficiently in advance of operations to allow assignment of personnel and scheduling of tests.
- D. Cooperate with Structural Testing/Inspection Agency and provide access to work.
- E. Provide samples of materials to be tested in required quantities.
- F. Furnish copies of mill test reports when requested.
- G. Provide storage space for Structural Testing/Inspection Agency's exclusive use, such as for storing and curing concrete testing samples.
- H. Provide labor to assist the Structural Testing/Inspection Agency in performing tests/inspections.

### 3.4 OPTIONS

- A. If the Structural Testing/Inspection Agency is located at such a distance from the project that travel expenses will be a consideration, or if the amount of sampling performed is minor, and by mutual agreement of the Design Professional and Contractor, the Contractor may be requested to take samples and forward them to the Structural Testing/Inspection Agency for testing/inspection.

END OF SECTION

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
<b>1705.1.1 Special Cases</b> (work unusual in nature, including but not limited to alternative materials and systems, unusual design applications, materials and systems with special manufacturer's requirements - add additional rows as needed.)	Submittal review, shop (3) and/or field inspection				
1. Inspection of anchors post-installed in solid grouted masonry: Per research reports including verification of anchor type, anchor dimensions, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, masonry unit, grout, masonry compressive strength, anchor embedment and tightening torque	Field inspection	Y	Periodic or as required by the research report issued by an approved source		
2. Aggregate Pier Inspection: The special inspector's responsibilities include, but are not limited to, review of the aggregate pier designer's use of soil parameters as presented in the project soils report, and during construction, verification of aggregate properties, type and number of lifts of aggregate, hole size and depths and top elevations of the pier elements, and applied energy. Additionally, results of qualitative tests on production aggregate pier elements such as modulus load testing, uplift pull-out testing, bottom stabilization tests and dynamic cone penetration tests, shall be reviewed to verify compliance with design specifications.	Field inspection	N	Periodic or as required by the research report issued by an approved source		
<b>1705.2.1 Structural Steel Construction</b>					
1. Fabricator and erector documents (Verify reports and certificates as listed in AISC 360, Section N 3.2 for compliance with construction documents)	Submittal Review	Y	Each submittal		
2. Material verification of structural steel	Shop (3) and field inspection	Y	Periodic		
3. Structural steel welding:					
a. Inspection tasks Prior to Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-1)	Shop (3) and field inspection	Y	Observe or Perform as noted (4)		
b. Inspection tasks During Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-2)	Shop (3) and field inspection	Y	Observe (4)		
c. Inspection tasks After Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-3)	Shop (3) and field inspection	Y	Observe or Perform as noted (4)		
d. Nondestructive testing (NDT) of welded joints: <i>see Commentary</i>					
1) Complete penetration groove welds 5/16" or greater in risk category III or IV	Shop (3) or field ultrasonic testing - 100%	Y	Periodic		
2) Complete penetration groove welds 5/16" or greater in risk category II	Shop (3) or field ultrasonic testing - 10% of welds minimum	N	Periodic		

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
3) Welded joints subject to fatigue when required by AISC 360, Appendix 3, Table A-3.1	Shop (3) or field radiographic or Ultrasonic testing	N	Periodic		
4) Fabricator's NDT reports when fabricator performs NDT	Verify reports	Y	Each submittal (5)		
4. Structural steel bolting:	Shop (3) and field inspection				
a. Inspection tasks Prior to Bolting (Observe, or perform tasks for each bolted connection, in accordance with QA tasks listed in AISC 360, Table N5.6-1)		Y	Observe or Perform as noted (4)		
b. Inspection tasks During Bolting (Observe the QA tasks listed in AISC 360, Table N5.6-2)		Y	Observe (4)		
1) Pre-tensioned and slip-critical joints					
a) Turn-of-nut with matching markings			Periodic		
b) Direct tension indicator			Periodic		
c) Twist-off type tension control bolt			Periodic		
d) Turn-of-nut without matching markings			Continuous		
e) Calibrated wrench			Continuous		
2) Snug-tight joints		Y	Periodic		
c. Inspection tasks After Bolting (Perform tasks for each bolted connection in accordance with QA tasks listed in AISC 360, Table N5.6-3)		Y	Perform (4)		
5. Visual inspection of exposed cut surfaces of galvanized structural steel main members and exposed corners of the rectangular HSS for cracks subsequent to galvanizing	Shop (3) or field inspection	N	Periodic		
6. Embedments (Verify diameter, grade, type, length, embedment. See 1705.3 for anchors)	Field inspection	Y	Periodic		
7. Verify member locations, braces, stiffeners, and application of joint details at each connection comply with construction documents	Field inspection	Y	Periodic		
<b>1705.2.2 Cold-Formed Steel Deck</b>					
1. Manufacturer documents (Verify reports and certificates as listed in SDI QA/QC, Section 2, Paragraphs 2.1 and 2.2 for compliance with construction documents)	Submittal Review	N	Each submittal		
2. Material verification of steel deck, mechanical fasteners and welding materials	Shop (3) and field inspection	N	Periodic		
3. Cold-formed steel deck placement:	Shop (3) and field inspection	N			
a. Inspection tasks Prior to Deck Placement (Perform the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.1)			Perform (4)		
b. Inspection tasks After Deck Placement (Perform the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.2)			Perform (4)		
4. Cold-formed steel deck welding:	Shop (3) and field inspection	N			
a. Inspection tasks Prior to Welding (Observe the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.3)			Observe (4)		
b. Inspection tasks During Welding (Observe the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.4)			Observe (4)		
c. Inspection tasks After Welding (Perform the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.5)			Perform (4)		

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
5. Cold-formed steel deck mechanical fastening:	Shop (3) and field inspection	N			
a. Inspection tasks Prior to Mechanical Fastening (Observe the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.6)			Observe (4)		
b. Inspection tasks During Mechanical Fastening (Observe the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.7)			Observe (4)		
c. Inspection tasks After Mechanical Fastening (Perform the QA tasks listed in SDI QA/QC, Appendix 1 Table 1.8)			Perform (4)		
<b>1705.2.3. Open-Web Steel Joists and Joist Girders</b>					
1. Installation of open-web steel joists and joist girders.		N			
a. End connections - welding or bolted.	per SJI CJ or SJI 100		Periodic		
b.. Bridging - horizontal or diagonal.					
1) Standard bridging.	per SJI CJ or SJI 100		Periodic		
2) Bridging that differs from the specifications listed in SJI CJ or SJI 100.			Periodic		
<b>1705.2.4. Cold-Formed Steel Trusses Spanning 60 feet or Greater</b>					
Verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field inspection	N	Periodic		
<b>1705.3 Concrete Construction</b>					
1. Inspection and placement verification of reinforcing steel and prestressing tendons.	Shop (3) and field inspection	Y	Periodic		
2. Reinforcing bar welding:					
a. Verification of weldability of bars other than ASTM A706.		Y	Periodic		
b. Inspection of single-pass fillet welds 5/16 or less in size.		Y	Periodic		
c. Inspection of all other welds.		Y	Continuous		
3. Inspection of anchors cast in concrete.	Shop (3) and field inspection	Y	Periodic		
4. Inspection of anchors post-installed in hardened concrete members per research reports, or, if no specific requirements are provided, requirements shall be provided by the registered design professional and approved by the building official, including verification of anchor type, anchor dimensions, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, concrete minimum thickness, anchor embedment and tightening torque	Field inspection		Periodic or as required by the research report issued by an approved source		
a. Adhesive anchors installed in horizontal or upward-inclined orientation that resist sustained tension loads.		Y	Continuous		
b. Mechanical and adhesive anchors note defined in 4a.		Y	Periodic		
5. Verify use of approved design mix	Shop (3) and field inspection	Y	Periodic		
6. Prior to placement, fresh concrete sampling, perform slump and air content tests and determine temperature of concrete and perform any other tests as specified in construction documents.	Shop (3) and field inspection	Y	Continuous		
7. Inspection of concrete and shotcrete placement for proper application techniques	Shop (3) and field inspection	Y	Continuous		

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
8. Verify maintenance of specified curing temperature and techniques	Shop (3) and field inspection	Y	Periodic		
9. Inspection of prestressed concrete:	Shop (3) and field inspection				
a. Application of prestressing force		Y	Continuous		
b. Grouting of bonded prestressing tendons		Y	Continuous		
10. Inspect erection of precast concrete members		Y	Periodic		
11. Verification of in-situ concrete strength, prior to stressing of tendons in post tensioned concrete and prior to removal of shores and forms from beams and structural slabs	Review field testing and laboratory reports	N	Periodic		
12. Inspection of formwork for shape, lines, location and dimensions	Field inspection	Y	Periodic		
13. Concrete strength testing and verification of compliance with construction documents	Field testing and review of laboratory reports	Y	Periodic		
<b>1705.4 Masonry Construction</b>					
<b>MINIMUM VERIFICATION REQUIREMENTS</b>					
<b>(A) Level 1, 2 and 3 Quality Assurance:</b>					
1. Prior to construction, verification of compliance of submittals	Submittal Review	Y	Prior to Construction		
<b>(B) Level 2 &amp; 3 Quality Assurance:</b>					
1. Prior to construction verification of f'm and f' AAC except where specifically required by the code	Testing by unit strength method or prism test method	Y	Prior to Construction		
2. During construction, verification of Slump Flow and Visual Stability Index (VSI) when self-consolidating grout is delivered to project site.	Testing by unit strength method or prism test method	Y	Periodic		
<b>(C) Level 3 Quality Assurance:</b>					
1. During construction, verification of f'm and f' AAC for every 5,000 SF	Testing by unit strength method or prism test method	Y	Periodic		
2. During construction, verification of proportions of materials as delivered to the project site for premixed or preblended mortar, prestressing grout, and grout other than self-consolidating grout.	Field inspection	Y	Periodic		
<b>MINIMUM SPECIAL INSPECTION REQUIREMENTS</b>					
<b>(D) Levels 2 and 3 Quality Assurance:</b>					
<b>1. As masonry construction begins, verify that the following are in</b>					
a. Proportions of the site-prepared mortar	Field inspection	Y	Periodic		
b. Grade and size of prestressing tendons and anchorages	Field Inspection	N	Periodic		
c. Grade, type, and size of reinforcement, anchor bolts, and prestressing tendons and anchorages	Field Inspection	Y	Periodic		

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
d. Prestressing technique	Field Inspection	N	Periodic		
e. Properties of thin-bed mortar for AAC masonry	Field Inspection	N	Level 2 - Continuous <sup>(b)</sup> Level 2 - Periodic <sup>(c)</sup>		
(b) Required for the first 5,000 square feet (c) Required after the first 5,000 square feet		N	Level 3 - Continuous		
f. Sample panel construction		Field Inspection	Y	Level 2 - Periodic Level 3 - Continuous	
<b>2. Prior to grouting, verify that the following are in compliance:</b>					
a. Grout space	Field Inspection	Y	Level 2 - Periodic Level 3 - Continuous		
b. Placement of prestressing tendons and anchorages	Field Inspection	N	Periodic		
c. Placement of reinforcement, connectors, and anchor bolts	Field inspection	Y	Level 2 - Periodic Level 3 - Continuous		
d. Proportions of site-prepared grout and prestressing grout for bonded tendons	Field Inspection	Y	Periodic		
<b>3. Verify compliance of the following during construction:</b>					
a. Materials and procedures with the approved submittals	Field inspection	Y	Periodic		
b. Placement of masonry units and mortar joint construction	Field Inspection	Y	Periodic		
c. Size and location of structural members	Field inspection	Y	Periodic		
d. Type, size, location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction	Field inspection		Level 2 - Periodic		
		Y	Level 3 - Continuous		
e. Welding of reinforcement	Field inspection	N	Continuous		
f. Preparation, construction, and protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F)	Field inspection	Y	Periodic		
g. Application and measurement of prestressing force	Field testing	N	Continuous		
h. Placement of grout and prestressing grout for bonded tendons is in compliance	Field inspection	Y	Continuous		
i. Placement of AAC masonry units and construction of thin-bed mortar joints	Field inspection	N	Level 2 - Continuous <sup>(b)</sup> Level 2 - Periodic <sup>(c)</sup>		
(b) Required for the first 5,000 square feet (c) Required after the first 5,000 square feet		N	Level 3 - Continuous		
4. Observe preparation of grout specimens, mortar specimens, and/or prisms		Field inspection	N	Level 2 - Periodic Level 3 - Continuous	
<b>1705.5 Wood Construction</b>					
1. For prefabricated wood structural elements, inspection of the fabrication process and assemblies in accordance with Section 1704.2.5.	In-plant review (3)	N	Periodic		
2. For high-load diaphragms, verify grade and thickness of structural panel sheathing agree with approved building plans.	Field inspection	N	Periodic		
3. For high-load diaphragms, verify nominal size of framing members at adjoining panel edges, nail or staple diameter and length, number of fastener lines, and that spacing between fasteners in each line and at edge margins agree with approved building plans	Field inspection	N	Periodic		

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
4. Metal-plate-connected wood trusses:		N			
a. Verification that permanent individual truss member restraint/bracing has been installed in accordance with the approved truss submittal package when the truss height is greater than or equal to 60".	Field inspection		Periodic		
b. For trusses spanning 60 feet or greater: verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field inspection		Periodic		
<b>1705.6 Soils</b>					
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	Field inspection	Y	Periodic		
2. Verify excavations are extended to proper depth and have reached proper material.	Field inspection	Y	Periodic		
3. Perform classification and testing of compacted fill materials.	Field inspection	Y	Periodic		
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill	Field inspection	Y	Continuous		
5. Prior to placement of controlled fill, inspect subgrade and verify that site has been prepared properly	Field inspection	Y	Periodic		
<b>1705.7 Driven Deep Foundations</b>					
1. Verify element materials, sizes and lengths comply with requirements	Field inspection	N	Continuous		
2. Determine capacities of test elements and conduct additional load tests, as required	Field inspection	N	Continuous		
3. Inspect driving operations and maintain complete and accurate records for each element	Field inspection	N	Continuous		
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element	Field inspection	N	Continuous		
5. For steel elements, perform additional inspections per Section 1705.2	See Section 1705.2	N	See Section 1705.2		
6. For concrete elements and concrete-filled elements, perform tests and additional inspections per Section 1705.3	See Section 1705.3	N	See Section 1705.3		
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge	Field inspection	N	In accordance with construction documents		

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
<b>1705.8 Cast-in-Place Deep Foundations</b>					
1. Inspect drilling operations and maintain complete and accurate records for each element	Field inspection	N	Continuous		
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	Field inspection	N	Continuous		
3. For concrete elements, perform tests and additional inspections in accordance with Section 1705.3	See Section 1705.3	N	See Section 1705.3		
<b>1705.9 Helical Pile Foundations</b>					
Verify installation equipment, pile dimensions, tip elevations, final depth, final installation torque and other installation data as required by construction documents.	Field inspection	N	Continuous		
<b>1705.10 Fabricated items</b>					
1. List of fabricated items requiring special inspection during fabrication:	Shop inspection	N	As noted in each applicable shop activity		
2. List of fabricated items to be fabricated on the premises of a fabricator approved to perform such work without special inspection (including name of approved agency providing periodic auditing):		N			
<b>1705.11.1 Structural Wood Special Inspections For Wind Resistance</b>					
1. Inspection of field gluing operations of elements of the main windforce-resisting system	Field inspection	N	Continuous		
2. Inspection of nailing, bolting, anchoring and other fastening of components within the main windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.	Shop (3) and field inspection	N	Periodic		
<b>1705.11.2 Cold-formed Steel Special Inspections For Wind Resistance</b>					
1. Inspection during welding operations of elements of the main windforce-resisting system	Shop (3) and field inspection	N	Periodic		
2. Inspection of screw attachment, bolting, anchoring and other fastening of components within the main windforce-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.	Shop (3) and field inspection	N	Periodic		
<b>1705.11.3 Wind-resisting Components</b>					
1. Roof covering, roof deck and roof framing connections.	Shop (3) and field inspection	N	Periodic		
2. Exterior wall covering and wall connections to roof and floor diaphragms.	Shop (3) and field inspection	N	Periodic		
<b>1705.12.1 Structural Steel Special Inspections for Seismic Resistance</b>					
1. Seismic force-resisting systems in SDC B, C, D, E, or F.	Shop (3) and field inspection	N	In accordance with AISC 341		
2. Structural steel elements in SDC B, C, D, E, or F other than those in Item 1. including struts, collectors, chords and foundation elements.	Shop (3) and field inspection	N	In accordance with AISC 341		



SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
<b>1705.12.2 Structural Wood Special Inspections for Seismic Resistance</b>					
1. Field gluing operations of elements of the seismic-force resisting system for SDC C, D, E or F.	Field inspection	N	Continuous		
2. Nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system including wood shear walls, wood diaphragms, drag struts, shear panels and hold-downs for SDC C, D, E or F.	Shop (3) and field inspection	N	Periodic		
<b>1705.12.3 Cold-formed Steel Light-Frame Construction Special Inspections for Seismic Resistance</b>					
1. During welding operations of elements of the seismic-force-resisting system for SDC C, D, E or F.	Shop (3) and field inspection	N	Periodic		
2. Screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs for SDC C, D, E or F.	Shop (3) and field inspection	N	Periodic		
<b>1705.12.4 Designated Seismic Systems Verification Special Inspections for Seismic Resistance</b>					
For SDC C, D, E or F, inspect and verify that the component label, anchorage or mounting conforms to the certificate of compliance in accordance with ASCE 7 Section 13.2.2.	Field inspection	N	Periodic		
<b>1705.12.5 Architectural Components Special Inspections for Seismic Resistance</b>					
1. For SDC D, E or F, inspection during the erection and fastening of exterior cladding and interior or exterior veneer more than 30 feet above grade or walking surface and weighing more than 5 psf.	Field inspection	N	Periodic		
2. For SDC D, E or F, inspection during the erection and fastening of interior nonbearing walls more than 30 feet above grade or walking surface and weighing more than 15 psf.	Field inspection	N	Periodic		
3. For SDC D, E or F, inspection during the erection and fastening of exterior nonbearing walls more than 30 feet above grade or walking surface.		N			
4. For SDC D, E or F, inspection during anchorage of access floors	Field inspection	N	Periodic		
<b>1705.12.6 Plumbing, Mechanical and Electrical Components Special Inspections for Seismic Resistance</b>					
1. Inspection during the anchorage of electrical equipment for emergency or standby power systems in SDC C, D, E or F	Field inspection	Y	Periodic		
2. Inspection during the anchorage of other electrical equipment in SDC E or F	Field inspection	N	Periodic		
3. Inspection during installation and anchorage of piping systems designed to carry hazardous materials, and their associated mechanical units in SDC C, D, E or F	Field inspection	N	Periodic		

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
4. Inspection during the installation and anchorage of HVAC ductwork designed to contain hazardous materials in SDC C, D, E or F	Field inspection	N	Periodic		
5. Inspection during the installation and anchorage of vibration isolation systems in SDC C, D, E or F where nominal clearance of 1/4 inch or less is required by the approved construction documents	Field inspection	N	Periodic		
6. Inspection during installation of mechanical and electrical equipment, including duct work, piping systems and their structural supports, where automatic fire sprinkler systems are installed in structures assigned to SDC C, D, E, or F to verify one of the following unless flexible sprinkler hose fittings are used:					
a. ASCE/SEI 7, Section 13.2.3 minimum required clearances have been provided.	Field inspection	Y	Periodic		
b. A three inch or greater nominal clearance has been provided between fire protection sprinkler system drops and sprigs and: structural members not used collectively or independently to support the sprinklers; equipment attached to the building structure; and other systems' piping.	Field inspection	Y	Periodic		
<b>1705.12.7 Storage Racks Special Inspections for Seismic Resistance</b>					
Inspection during the anchorage of storage racks 8 feet or greater in height in structures assigned to SDC D, E or F.	Field inspection	N	Periodic		
<b>1705.12.8 Seismic Isolation Systems</b>					
Inspection during the fabrication and installation of isolator units and energy dissipation devices used as part of the seismic isolation system in structures assigned to SDC B, C, D, E or F.	Shop and field inspection	N	Periodic		
<b>1705.12.9 Cold-formed Steel Special Bolted Moment Frames</b>					
Inspection of installation of cold-formed steel special bolted moment frames in the seismic force-resisting systems in structures assigned to SDC D, E or F.	Field inspection	N	Periodic		
<b>1705.13.1 Structural Steel Testing for Seismic Resistance</b>					
1. Nondestructive testing of structural steel in the seismic force-resisting systems in accordance with AISC 341 in structures assigned to SDC B, C, D, E or F.	Field test	N	Periodic		
2. Nondestructive testing of structural steel elements in the seismic force-resisting systems not covered in 1 above including struts, collectors, chords and foundation elements in accordance with AISC 341 in structures assigned to SDC B, C, D, E or F.	Field test	N	Periodic		

SCHEDULE OF SPECIAL INSPECTIONS SERVICES					
PROJECT	Buford Water Works Replacement				
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT			
		Y/N	EXTENT	AGENT*	DATE COMPLETED
<b>1705.13.2 Seismic Certification of Nonstructural Components</b>					
Review certificate of compliance for designated seismic system components in structures assigned to SDC B, C, D, E or F.	Certificate of compliance review	N	Each submittal		
<b>1705.13.3 Seismic Certification of Designated Seismic Systems</b>					
Review certificate of compliance for designated seismic system components in structures assigned to SDC C, D, E or F	Certificate of compliance review	N	Each submittal		
<b>1705.13.4 Seismic Isolation Systems</b>					
Test seismic isolation system in accordance with ASCE 7 Section 17.8 in structures assigned to SDC B, C, D, E or F.	Prototype testing	N	Per ASCE 7		
<b>1705.14 Sprayed Fire-resistant Materials</b>					
1. Verify surface condition preparation of structural members	Field inspection	N	Periodic		
2. Verify minimum thickness of sprayed fire-resistant materials applied to structural members	Field inspection	N	Periodic		
3. Verify density of the sprayed fire-resistant material complies with approved fire-resistant design	Field inspection and testing	N	Per IBC Section 1705.14.5		
4. Verify the cohesive/adhesive bond strength of the cured sprayed fire-resistant material	Field inspection and testing	N	Per IBC Section 1705.14.6		
5. Condition of finished application	Field inspection	N	Periodic		
<b>1705.15 Mastic and Intumescent Fire-Resistant Coatings</b>					
Inspect and test mastic and intumescent fire-resistant coatings applied to structural elements and decks per AWCI 12-B	Field inspection and testing	N	Periodic		
<b>1705.16 Exterior Insulation and Finish Systems (EIFS)</b>					
Inspection of water-resistive barrier over sheathing substrate	Field inspection	N	Periodic		
<b>1705.17 Fire-Resistant Penetrations and Joints</b>					
1. Inspect penetration firestop	Field testing	Y	Per ASTM E2174		
2. Inspect fire-resistant joint systems	Field testing	Y	Per ASTM E2393		
<b>1705.18 Smoke Control Systems</b>					
1. Leakage testing and recording of device locations prior to concealment	Field testing	N	Periodic		
2. Prior to occupancy and after sufficient completion, pressure difference testing, flow measurements, and detection and control verification	Field testing	N	Periodic		
<b>* INSPECTION AGENTS</b>					
<b>FIRM</b>	<b>ADDRESS</b>		<b>TELEPHONE NO.</b>		
1.					
2.					
3.					
4.					
<p>Notes: 1. The inspection and testing agent(s) shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official prior to commencing work. The qualifications of the Special Inspector(s) and/or testing agencies may be subject to the approval of the Building Official and/or the Design Professional.</p> <p>2. The list of Special Inspectors may be submitted as a separate document, if noted so above.</p> <p>3. Shop Inspections of fabricated items are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.1 and listed in activity 1709.2.</p> <p>4. Observe: Observe on a random basis, operations need not be delayed pending these inspections. Perform: These tasks shall be performed for each welded joint, bolted connection, or steel element.</p> <p>5. NDT of welds completed in an approved fabricator's shop may be performed by that fabricator when approved by the AHJ. Refer to AISC 360, N6.</p>					
Are Special Inspections for Seismic Resistance included in the Statement of Special Inspections?			Yes		
Are Special Inspections for Wind Resistance included in the Statement of Special Inspections?			No		
DATE:			10/22/2020		

## Special Inspections for Seismic Resistance

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See the Schedule of Special Inspections for inspection and testing requirements

**Seismic Design Category: C**

**Special Inspections for Seismic Resistance Required (Yes/No): Yes**

**Description of seismic force-resisting system subject to special inspection and testing for seismic resistance:**

(Where required per IBC Sections 1705.12.1, 1705.12.2, and 1705.12.3) (Special inspections for seismic resistance of structural steel, where required, shall be in accordance with AISC 341)

Special Reinforced Masonry Shear Walls

**Description of designated seismic systems subject to special inspection and testing for seismic resistance:**

(Required for architectural, electrical and mechanical systems and their components that require design in accordance with Chapter 13 of ASCE 7, have a component importance factor,  $I_p$ , greater than one and are in Seismic Design Categories C, D, E or F.)

Not Applicable

**Description of additional seismic systems and components requiring special inspections:**

(Required for systems noted in IBC Section 1705.12.5, 1705.12.6, 1705.12.7, and 1705.12.8.)

Anchorage of electrical equipment for emergency or standby power systems  
Installation of mechanical and electrical equipment, including duct work, piping systems, where automatic fire sprinkler systems are installed

**Description of additional seismic systems and components requiring testing:**

(Where required per IBC Section 1705.13)

Penetration Firestop  
Fire-resistant joint

**Statement of Responsibility:**

Each contractor responsible for the construction or fabrication of a system or component described above must submit a Statement of Responsibility.

## Special Inspections for Wind Resistance

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See the Schedule of Special Inspections for inspection and testing requirements

**Allowable Stress Design Wind Speed,  $V_{asd}$ : 88 m.p.h.**

**Wind Exposure Category: C**

**Special Inspection for Wind Resistance Required (Yes/No): No**

(Required in wind exposure Category B, where the allowable stress design wind speed,  $V_{asd}$ , is 120 miles per hour or greater. Required in wind exposure Category C or D, where the allowable stress design wind speed,  $V_{asd}$ , is 110 miles per hour or greater.)

**Description of structural wood and cold-formed steel light frame construction main windforce-resisting system subject to special inspections for wind resistance:**

(Required for systems noted in IBC Section 1705.11.1 and 1705.11.2).

**Description of windforce-resisting components subject to special inspections for wind resistance:**

(Required for systems and components noted in IBC Section 1705.11.3)

### **Statement of Responsibility:**

Each contractor responsible for the construction or fabrication of a system or component described above must submit a Statement of Responsibility.

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**SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Dewatering
- B. Temporary utilities.
- C. Support facilities
- D. Temporary sanitary facilities.
- E. Temporary Controls: Barriers, enclosures, and fencing.
- F. Security requirements.
- G. Vehicular access and parking.
- H. Waste removal facilities and services.
- I. Field offices.

1.2 RELATED DOCUMENTS

- A. Project Drawings
- B. General Provisions of the Contract, including:
  - 1. General Conditions
  - 2. Supplementary Conditions
  - 3. Division 01 Specification Sections

1.3 SUMMARY

- A. Requirements for security and protection facilities, temporary utilities, and support facilities are included in this section.
- B. Related Requirements
  - 1. Section 011000 - Summary
  - 2. Section 012100 - Allowances

1.4 USE CHARGES

- A. The Engineer, authorities having jurisdiction, testing agencies, occupants of Project, and owner's construction forces, along with any other entities engaged in the Project, are to be allowed to use temporary facilities and services without cost. The Contract Sum will include the removal, installation, and use charges for temporary facilities, unless otherwise indicated.
- B. Electric Power Service: The electric-power-service use charges for electricity used by all persons for construction purposes will be paid by the Contractor.
- C. Electric Power Service from Existing System: The Owner's existing system for electric power may be used with metering and without charge. Required extensions and connections and metering will be provided by the Contractor as required for construction purposes.
- D. Water Service from Existing System: The Owner's existing water system may be used with metering and without charge for construction purposes. Required extensions and connections and metering will be provided by the Contractor as required for construction purposes.

1.5 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Provide the details for construction personnel such as temporary utility lines and connections, vehicle circulation, temporary facilities, staging areas, construction site entrances, and parking areas.

- B. Termination and Implementation Schedule: Submit a schedule showing the termination and implementation dates for all temporary utilities within 15 days of the Notice to Proceed.

1.6 QUALITY ASSURANCE

- A. Temporary electric service installed shall comply with NFPA 70, NECA, NEMA, and UL standards and regulations.
- B. Tests and Inspections: Arrange for each temporary utility to be tested and inspected by authorities having jurisdiction. Required certifications and permits shall be obtained.
- C. Accessible Temporary Egress: Applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1 shall be followed.

1.7 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Before Owner's acceptance, engage the Installer of each permanent service to assume responsibility for maintenance, protection, and operation of each permanent service while being used as a construction facility, regardless of responsibilities that were previously assigned.

1.8 DEWATERING

- A. Provide temporary means and methods for dewatering all temporary facilities and controls.
- B. Maintain temporary facilities in operable condition as directed by Engineer.

1.9 TEMPORARY UTILITIES

- A. Installation, removal, and use charges for temporary facilities will be included in the Contract Cost unless noted otherwise. Other entities involved in the Project shall be permitted to use temporary utilities without cost.

1.10 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

1.11 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.12 SECURITY

- A. Provide security and facilities to protect work, existing facilities, and owner's operations from unauthorized entry, vandalism, or theft.

1.13 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.



1.14 WASTE REMOVAL

- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.15 FIELD OFFICES

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
- C. Locate offices a minimum distance of 30 feet (10 m) from existing and new structures.

1.16 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Temporary Chain-Link Fencing: Minimum 2 inch galvanized steel fence fabric, 6 feet high with galvanized-steel pipe posts, corner and pull posts. Existing galvanized steel fence fabric and posts shown to be removed from the site may be used provided it meets above requirements and is re-usable and salvageable.
- B. Dust-Control Adhesive-Surface Walk-Off Mats: Mats shall be a minimum of 36 by 60 inches.

2.2 TEMPORARY FACILITIES

- A. Storage and Fabrication Sheds: Sheds shall be equipped, furnished, and sized to accommodate equipment and materials for construction.
  - 1. Combustible materials shall be stored separately from building.
- B. Field Offices are defined as mobile or preconstructed units with foundations which support normal loading, temperature controls, and serviceable finishes.

2.3 EQUIPMENT

- A. Fire Extinguishers shall be UL rated, portable, and have an extinguishing agent and class as required by classes of fire exposure and location.

PART 3 EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Consider conservation of water, energy, and materials when planning construction and use of temporary facilities in order to minimize waste.

### 3.2 INSTALLATION, GENERAL

- A. Facilities to be located where they can appropriately serve the Project, while resulting in minimum interference with the performance of the Work as specified in Section 011000 "Summary." Facilities shall be modified and relocated as required as the Work progresses.
- B. Facilities shall be ready to use to avoid delay, and shall not be removed until they are no longer needed, or are replaced with completed permanent facilities that have been authorized for use.
- C. Isolation of Work Areas in Occupied Areas in Occupied Facilities: Do not allow fumes, odors, and dust to enter occupied areas.
  - 1. Construction cleanup and final cleanup with approved, HEPA-filter-equipped vacuum equipment shall be performed daily.
  - 2. Use vacuum collection attachments on dust-producing equipment.
  - 3. Isolate limited work with portable dust-containment devices.
  - 4. Maintain dust partitions during the Work.

### 3.3 TEMPORARY UTILITY INSTALLATION

- A. Schedule a time with the Owner, utility company, and existing users when the service can be interrupted to install a temporary service, or connect to an existing service.
- B. Electric Power Service: Connect to the Owner's existing electric power service. Maintain Owner's existing power service in a condition the Owner finds acceptable.
- C. Water Service: Connect Owner's existing water service facilities to the temporary water service. Water service facilities shall be maintained and clean in a manner in which the Owner finds acceptable. When the Project reaches Substantial Completion, facilities shall be restored to the same condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, drinking water, and wash facilities for construction personnel's use. Facilities are to meet requirements of authorities having jurisdiction for location, number, type, maintenance, and operation of fixtures and facilities.
  - 1. Use of Permanent Toilets: Use of the Owner's new or existing toilet facility is not allowed.
- E. Lighting: Provide temporary lighting with local switching that gives sufficient illumination for construction inspections, traffic conditions, operations, and observations.
  - 1. Without operating the entire system, install and operate temporary lighting that meets protection and security requirements.
- F. Electronic Communication Service: Provide a secure WiFi wireless connection to internet. The provisions for access shall be given to Engineer and Owner.
- G. Temporary Heating and Cooling: Provide temporary heating and cooling as needed to protect finished products from negative effects of high humidity or low temperatures or curing or drying finished installations. Choose heating and cooling equipment that will not have a negative effect on the finished product or items being installed.

### 3.4 SUPPORT FACILITIES INSTALLATION

- A. Temporary Roads and Paved Areas: Construct temporary roads and paved areas as shown on Drawings. Temporary roads and paved areas to be constructed and maintained in a manner sufficient for construction operations.
- B. Temporary Use of Planned Permanent Roads and Paved Areas: Locations of permanent roads and paved areas will serve as the same location as temporary roads and paved areas. Temporary roads and paved areas to be constructed and maintained in a manner sufficient for construction operations. Within the construction limits, temporary roads and paved areas to be extended, as needed for construction purposes.
  - 1. Preparation and installation of subgrade, subbase, and base for temporary roads to conform with Section 312000 "Earth Moving."

2. Use elevations of permanent roads and paved areas for elevations of temporary roads and paved areas.
  3. After temporary use, recondition the base, including removing contaminated material, regrading, proofrolling, compacting, and testing.
  4. Installation of final course of permanent hot-mix asphalt pavement shall be immediately before Substantial Completion. Before installation of final course, fix hot-mix asphalt base-course pavement in accordance with Section 321216 "Asphalt Paving"
- C. Traffic Controls: Requirements of authorities having jurisdiction shall be followed at all times.
1. Access to fire-fighting equipment and fire hydrants shall be maintained at all times.
  2. Existing site improvements to remain to be protected.
- D. Staging and storage: Use areas designated on the Project site for staging and storage necessities.
- E. Project signs: Signs unauthorized are not permitted. Install Project signs as indicated.
1. Clean and maintain signs to be legable at all times.
  2. Temporary Signs: Place signs as shown and necessary to inform individuals and public looking to enter the Project.
    - a. Place temporary, directional signs for visitors and construction personnel.
- F. Waste Disposal Facilities: Follow guidelines set in Section 017419 "Construction Waste Management and Disposal" and cleaning guidelines in Section 017000 "Execution." Provide containers for waste disposal sufficient in size for construction operations. Follow guidelines for authorities having jurisdiction.
- G. Drains and Dewatering Facilities: Follow guidelines of authorities having jurisdiction. Keep water off the Project Site, including excavations and construction.
- H. Temporary Stairs: Provide temporary stairs if ladders are not sufficient until permanent stairs are available.
- I. Temporary Use of Permanent Stairs: Given new stairs are protected and at Substantial Completion finishes are restored to new condition, use of stairs for construction traffic is permitted.
- J. Lifts and Hoists: Provide facilities required to hoist personnel and materials.
1. "Tools and Equipment" include equipment used for hoisting materials, including truck cranes and similar devices, and are not temporary facilities.
- K. Adhere to the following:
1. Construct noncombustible, temporary shops, sheds, and field offices within the construction area within 30 feet of building lines in accordance with ASTM E136. These facilities shall be accordance with NFPA 241.
  2. Until Engineer schedules Substantial Completion, maintain support facilities. After Substantial Completion, personnel remaining will be allowed to use permanent facilities, given conditions accepted by the Owner are met.
- 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Site Enclosure Fence: Install and furnish site enclosure fence around existing water works site facilities to provide facility security and prevent unauthorized entry to water works facilities. In addition, install and furnish site enclosure fence around portions or the work under construction in a way that will keep people from easily entering the site at locations other than the entrance gates prior to construction operations starting.
1. Limit number of keys and restrict circulation only to authorized personnel in order to maintain security. Provide a set of keys to the Owner.

2. The extent of the fence shall be as shown on Drawings. Maintain temporary fencing until replaced by permanent fencing shown elsewhere in the Contract Documents.
- B. Security Enclosure and Lockup: Install lockable entrances to temporary enclosure around partially finished areas in order to prevent theft, vandalism, unauthorized entry, and similar security violations. At the end of each day, lock said entrances.
- C. Temporary Enclosures: In order to protect construction that is partially complete and finished from foul weather, exposure, other construction operations, and similar activities, install temporary enclosures. For the exterior of buildings, provide a temporary weathertight enclosure.
  1. Insulate temporary enclosures where permanent enclosure is incomplete and heating and cooling is needed.
- D. Temporary Egress: Install signage directing occupants to temporary egress. Temporary egress shall be installed from existing occupied facilities as required by authorities having jurisdiction and indicated.
- E. Barricades, Warning Signs, and Lights: Abide by requirements set by authorities having jurisdiction for constructing structurally acceptable barricades, including warning signs and lighting.
- F. Temporary Fire Protection: Abide by NFPA 241; manage fire-prevention program. Protect against reasonably controllable and predictable fire losses by constructing and maintaining temporary-fire protection facilities of necessary types.
  1. Post information and warnings. Create and supervise an overall fire prevention and protection program for personnel at the Project site. Review needs with local fire department and establish steps to be followed. Instruct personnel on methods and procedures.
  2. Ban smoking in construction areas. Abide by additional regulations on smoking stated in other Sections.
  3. In accordance with requirements of authorities having jurisdiction, supervise combustion-type temporary heating units, welding operations, and similar operations.
  4. Provide temporary hoses and standpipes for protection from fire. Hose size to match outlet size and to be equip with suitable nozzles. A warning sign stating the hose is not to be removed and is for fire protection purposes only. is to be hung with hoses.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Availability to temporary facilities shall be limited to essential and intended uses to minimize abuse and waste. In use of temporary facilities, administer strict discipline.
- B. Temporary Facility Changeover: Protection facilities and temporary security shall not be changed over to permanent facilities until Substantial Completion.
- C. Maintenance: Facilities shall be kept in good operating condition until it is removed.
  1. Where needed to prevent possibility of damage and have indicated results, maintain operation of temporary humidity control, ventilation, cooling, heating, enclosures, and similar facilities on a 24-hour basis.
- D. Termination and Removal: Temporary facilities shall be removed no later than Substantial Completion, when the need for its service has ended, or when an authorized use of a permanent facility replaces it. Permanent construction that may have been delayed due to the temporary facility is to be completed, and if required, restored. Clean exposed surfaces, repair damaged Work, and replace Work if it cannot be repaired in a satisfactory manner.
  1. As required by authorities having jurisdiction, repair or replace curbs, sidewalks, and street paving at temporary entrances. Temporary roads and paved areas not acceptable for use or not intended for permanent construction shall be removed. Materials contaminated with asphalt, road oil, and other petrochemical compounds, along with other substances that may impair the growth of lawns or plant material are to be removed. Remove aggregate fill and soil that do not abide by requirements for subsoil or fill in areas intended for landscape development.

2. Owner has the right to take ownership of Project identification signs. Contractor's property is considered to be materials and facilities used as temporary facilities.
3. Abide by final clearing requirements specified in Section 017700 "Closeout Procedures." Permanent facilities used in construction are to be repaired, renovated, and cleaned at Substantial Completion.

END OF SECTION

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**SECTION 015630 - TEMPORARY EROSION AND SEDIMENT CONTROL**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This section includes requirements for temporary soil erosion and sedimentation control measures on the Project including, but not limited to, the following:
  - 1. Implementation of the Erosion and Sedimentation Control measures shown on the drawings and included in the Contract Documents.
  - 2. Providing inspections, reporting, record keeping, and submittals as required.
  - 3. Maintaining and correcting all structural practices and vegetative measures employed.
  - 4. After establishment of permanent vegetation, removing unnecessary structural practices and restoring surfaces.
- B. Related Sections include the following:
  - 1. Section 015000 - Temporary Facilities and Controls: for other environmental-protection measures during construction, temporary utilities, and temporary construction and support facilities.
  - 2. Section 311000 - Site Clearing: for clearing and grubbing and protection of above-grade and underground improvements.
  - 3. Section 329219 - Seeding: for the establishment of permanent grassing and vegetation and placing planting soil mixes and testing of topsoil material.
  - 4. Section 329300 - Plants: for the establishment of permanent softscape landscaping including plants, shrubs, and trees.

**1.3 DEFINITIONS**

- A. Certified Personnel: Persons who have successfully completed the Georgia Soil and Water Conservation Commission erosion control certification program (Level 1A) and possess a current certification card from the Commission.

**1.4 SUBMITTALS:**

- A. Product Data: For the following:
  - 1. Silt fence geotextile fabric
  - 2. Fertilizer, lime, nitrogen
  - 3. Temporary grass seed
- B. Qualification Data: Certification numbers for Certified Personnel.
- C. Erosion Control Officer: Designate one individual to be responsible for the implementation and maintenance of erosion and sediment controls on a 24-hour per day, everyday basis. Furnish individuals name, address, and 24-hour phone number and update information as necessary. The contractor's 24-hour contact must possess a GSWCC Blue Card.

**1.5 QUALITY ASSURANCE**

- A. Regulations: Comply with industry standards and applicable Laws and Regulations of authorities having jurisdiction, including but not limited to:
  - 1. Georgia Erosion and Sedimentation Control Act of 1975, as amended.
- B. Standards: Where requirements are not shown or specified otherwise, comply with the "Manual for Erosion and Sediment Control in Georgia" as amended, published by the

Georgia Soil and Water Conservation Commission.

- C. Source Quality Control: Use grassing materials with certificates of inspection as required by governmental authorities. Comply with regulations governing grassing materials.
- D. Personnel Certifications: Personnel assigned to construction, monitoring, or inspection shall have Level 1A erosion control certification from the Georgia Soil and Water Conservation Commission and possess a current certification card issued by the Commission.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Silt Fence: During shipment and storage, wrap the fabric in a heavy-duty covering that will protect the cloth from sunlight, mud, dust, dirt, and debris. Do not expose the fabric to temperatures greater than 140 F.

#### 1.7 PROJECT CONDITIONS

- A. The arrangement, location, and operating techniques relating to the erosion and sediment control measures necessary to accomplish the Work and satisfy the requirements specified herein are the sole responsibility of the Contractor.
- B. Modify erosion and sediment control facilities or procedures that cause or threaten to cause damage to existing or new facilities. It is the responsibility of the Contractor to modify procedures and/or perform other construction as necessary to avoid damage to such facilities.
- C. Coordinate temporary provisions with the permanent erosion control features specified elsewhere in the Contract Documents to the extent practical to provide economical, effective and continuous erosion control throughout the construction and post-construction period.
- D. Maintain erosion control measures at all times. Install additional erosion and sediment control measures if deemed necessary by onsite inspection from Owner, Engineer, or regulatory agency.
- E. Utility Locator Service: Notify utility locator service for the area where Project is located before beginning temporary erosion and sediment control activities.

### PART 2 - PRODUCTS

#### 2.1 VEGETATIVE MEASURES

- A. General: Comply with the minimum criteria in Section II - Vegetative Measures, Chapter 6 of the "Manual for Erosion and Sediment Control in Georgia" as amended, published by the Georgia Soil and Water Conservation Commission and the more detailed specifications for certain items shown in the paragraphs below.
- B. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- C. Temporary Grass Seed: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the AOSA's "Journal of Seed Technology; Rules for Testing Seeds". Provide seed quality meeting the requirements of the Georgia Seed Laws and Rules and Regulations with a minimum of 70% germination and hard seed, minimum 90% purity, and a maximum 2% weed seeds. Use seed with maximum noxious seeds of 300 seeds per pound subject to limitations in Table 1 of Georgia D.O.T. Standard Specifications Section 890. Furnish seed of grass species shown on the Drawings that provides a temporary cover suitable to the area and that does not later compete with grasses sown for permanent cover.
- D. Lime: Calcitic or dolomitic limestone containing not less than 85 percent of total carbonates, ground so that not less than 90 percent passes a 10 mesh sieve and not less than 25 percent passes a 100 mesh sieve. Use more finely ground limestone when spreading by hydraulic seeding equipment.
- E. Fertilizer: Standard commercial-grade fertilizer conforming to the standards of the Association of Official Agricultural Chemists.



- F. Nitrogen: Standard commercial grade nitrogen conforming to state fertilizer laws. Provide in either granular or liquid form at the Contractor's option.

## 2.2 STRUCTURAL PRACTICES

- A. General: Comply with the minimum criteria in Section III – Structural Practices, Chapter 6 of the “Manual for Erosion and Sediment Control in Georgia” as amended, published by the Georgia Soil and Water Conservation Commission and the more detailed specifications for certain items shown in the paragraphs below.
- B. Silt Fence: Provide woven or nonwoven geotextile filter fabric using a pervious sheet of synthetic polymer filaments forming a stable network so that fibers retain their relative positions. Select either self-supporting fence fabric or wire supported fence fabric with a sufficiently strong wire fence to support applied loads. Select a silt fence not less than 36 inches wide and of the type recommended by its manufacturer for the intended application. Provide silt fence complying with Section 171 of Georgia Department of Transportation Standard Specifications for Road and Bridge Construction and listed in the Georgia Department of Transportation Qualified Products List 36. Provide Type C fence, unless noted otherwise.
- C. Straw Bales: Clean, seed-free cereal hay type, mechanically bound in standard rectangular shapes.

## PART 3 - EXECUTION

### 3.1 INSTALLATION ( GENERAL)

- A. Failure to comply with the Georgia Erosion and Sedimentation Act of 1975 or this Specification Section may result in a citation and fines from a local, State, or Federal Regulatory Agency. Should the Owner be cited or fined as a result of the Contractor failing to comply with the above requirements, the Contractor shall reimburse the Owner for any and all fines, penalties and related costs.
- B. Direct temporary erosion control toward and for the purpose of controlling soil erosion at its potential source. Employ downstream sediment entrapment measures only as a backup to primary control at the source. Employ a continuing program of installation and maintenance of sediment control measures during the construction period. Continue erosion control measures until the permanent vegetation and drainage facilities have been constructed and until the grass on planted slopes is sufficiently established to be an effective erosion deterrent.
- C. Schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can immediately follow thereafter if the project conditions permit; otherwise temporary erosion control measures may be required between successive construction stages.
- D. Indicated work shown on the drawings is the minimum required, and any and all necessary materials and operations including reworking must be performed to obtain specified results. It is the Contractor's responsibility to make his own evaluation of conditions and facilities, and of the effects of his proposed systems and construction methods.
- E. Maintain adequate control so that the stability of existing ground surfaces as well as newly excavated and constructed slopes are not adversely affected by water and that erosion is controlled.

### 3.2 EROSION CONTROL OFFICER

- A. Before beginning land disturbing activities, designate an Erosion Control Officer to initiate, install, maintain, inspect, and report the condition of all erosion and sedimentation control devices in the Contract Documents. Provide the Erosion Control Officer and alternate (if necessary) in compliance with the following:
  1. Be an employee of the Contractor.
  2. Successfully completed the Georgia Soil and Water Conservation Commission Certification Course Level 1A and holds a current certification card.

3. Provides phone numbers to the Owner and Engineer where the Erosion Control Officer can be located 24 hours a day.
- B. Provide the Erosion Control Officer with the following capabilities and duties:
1. Be available or have an approved representative available 24 hours a day and have access to the equipment, personnel, and materials needed to maintain erosion control and flooding control.
  2. Ensure that erosion control deficiencies are corrected within 24 hours or immediately during emergencies.
  3. During heavy rain, have the construction area patrolled day or night, any day of the week to quickly detect and correct erosion or flooding problems before they interfere with traffic flow, safety, public health, or downstream turbidity.
  4. Inform the Engineer and Owner in writing whenever the alternate Erosion Control Officer assumes project responsibilities.
  5. Be on the site 45 minutes after receiving notification of an emergency.
  6. Be present on the site at all times that land disturbing activity is underway or, if not present, furnishes an alternate on the site that has received the Level 1A certification from the Georgia Soil and Water Conservation Commission.

### 3.3 ERODIBLE AREA

- A. Schedule and perform the operation to complete temporary silt fence installation, sediment basin construction, and other temporary erosion control devices concurrently with clearing and grubbing
- B. Perform grading operations and implement permanent erosion control features immediately after installing temporary erosion control devices.
- C. Initiate vegetative stabilization measures on disturbed exposed areas within 14 days of ceasing temporary or permanent disturbance activities, unless disturbance activities will resume on the area within 21 days.

### 3.4 GRADING OPERATIONS

- A. Schedule grading so that the ground surface will be disturbed for the shortest possible time before permanent construction is installed. Maintain large areas as flat as possible to minimize soil transport through surface flow. Wherever steeper slopes or abrupt changes in grade are required, construct a diversion or berm at the top of the slope to cause surface water to flow along the diversion to a control point to be transported downslope in a slope drain. In no case shall surface water be allowed to flow uncontrolled down slopes.
- B. Provide temporary slope drain facilities with inlets and velocity dissipaters (straw bales, silt fence, aprons, etc.) to carry the runoff water to the bottom of the slopes. Place drains at intervals to handle the accumulated water.

### 3.5 VEGETATIVE MEASURES

- A. General: Comply with the minimum criteria in Section II - Vegetative Measures, Chapter 6 of the "Manual for Erosion and Sediment Control in Georgia" as amended, published by the Georgia Soil and Water Conservation Commission and the more detailed specifications for certain items shown in the paragraphs below.
- B. Temporary Grassing and Mulching: Perform permanent grassing, temporary grassing, or mulching on exposed soil surfaces and cut and fill slopes during earthwork operations at intervals no greater than every two weeks. Apply to exposed soil areas either on or off the site, including borrow areas, temporary haul roads, or waste areas. Limit use to not more than 6 months and apply permanent vegetation if needed for more than 6 months.
  1. Temporary Grass: Sow a quick growing species of grass suitable to the area and season. Furnish the minimum ground preparation required to provide a seedbed. Eliminate or reduce the application rate of fertilizer where grass growth conditions are suitable without fertilizer. Apply lime at a rate of one ton per acre. Omit mulch application at the Contractor's option. Roll seeded areas along the contour, and water in a manner that will encourage sprouting of seeds and growing of grass. Prepare and

reseed areas exhibiting unsatisfactory growth. Fill and reseed eroded areas.

2. Temporary Mulch: Areas to be mulched need not be to finished grade. Temporary mulching may be applied to slopes as steep as 2:1, horizontal to vertical, using a tractor to embed the mulch into a slope. Anchor mulch and apply to maintain cover on 90 % or more of soil surface.
- C. Mulch Stabilization: Apply a blanket of mulch to stabilize the soil and reduce erosion during periods when grassing is prohibited. Before mulching, construct areas to finished grade and cross-section in accordance with the requirements for finishing embankments and/or excavated areas, whichever is applicable. Uniformly spread mulch over the designated areas from 2 inches to 4 inches thick. After spreading, mix into the top 2 inches of the soil by light discing, by using empty sheep foot rollers, or by any other means which does not destroy the finished cross-section of the prepared areas. When grassing operations begin, leave the mulch in place and plow into the soil during the process of seedbed preparation. Mulch required for the protection of newly planted grass is in addition to the mulch specified herein.
  1. Apply netting over mulched areas on slopes steeper than 2:1.
- D. Dust Control: Keep dust pollution to a minimum during any land disturbing activities. Sprinkle water over exposed soil areas to reduce pollution.

### 3.6 STRUCTURAL PRACTICES

- A. General: Comply with the minimum criteria in Section III – Structural Practices, Chapter 6 of the “Manual for Erosion and Sediment Control in Georgia” as amended, published by the Georgia Soil and Water Conservation Commission and the more detailed specifications for certain items shown in the paragraphs below.
- B. Silt Fences: Locate silt fences at all points where surface water can leave the construction area having bypassed a silt trap if the source area is subject to soil erosion. Construct silt fences to remove sediments from flowing water through filtration and sedimentation and in accordance with the details shown on Drawings and the Manual for Erosion and Sedimentation Control in Georgia. Arrange silt fences to create ponding behind them. Where authorized by the Engineer, straw bales with anchor stakes may be substituted for silt fences where project duration does not exceed 3 months and slope length above bale does not exceed 50 feet.
  1. Install silt fence using the excavated trench method at 4 to 6 inches deep or the soil slicing method with a mechanical slice in the soil 8 to 12 inches deep.
  2. Install J-Hooks or Spurs on all silt fences located around the perimeter of the project and along the toe of embankments or slopes. J-Hooks or Spurs consist of silt fence turned back into the fill or slope to create small pockets that trap silt and force stormwater to flow through the silt fence. Place J-Hooks or Spurs at not less than 50 feet spacing, unless noted otherwise. Provide not less than 3 J-Hooks or Spurs on both sides of outlets for culverts, cross drains, and storm drains at a spacing not to exceed 30 feet.
  3. Establish sedimentation barriers or silt fences at the toe of slopes under construction. Relocate and reuse these barriers after permanent slope stabilization becomes established. As they are relocated, replace any defective materials in barrier. In addition, remove all debris and silt at the previous location.
  4. After removing the silt fence, finish grade the area to a smooth appearance and apply mulch and permanent grassing to the area.

### 3.7 MAINTENANCE

- A. General: As a minimum, clean the sediment from all temporary erosion control devices (except sediment basins) installed on the Project when one half the capacity, by height, depth or volume has been reached. Clean the sediment from all temporary sediment basins installed on the Project when one third the capacity of the storage volume has been filled.
  1. Handle sediment excavated from any erosion or sediment control device in one of the following ways:

- a. Remove sediment from the immediate area and immediately stabilize it to prevent the material from refilling any erosion or sediment control device,
  - b. Place and mix it in the site work embankment,
  - c. Waste it in an excess waste material spoil area designated on the site.
- 2. Repair or replace at no cost to the Owner, any erosion or sediment control devices that are not functioning properly or are damaged due to negligence or abuse.
- B. Protection of Mulched and Grassed Areas: Protect newly mulched or grassed areas from traffic and erosion, and keep free of trash and debris.
  - 1. Repair and re-establish mulch and grass in settled, eroded, and rutted areas to specified coverages and tolerances.
- C. Reconditioning Stabilized Vegetation Areas: Where completed stabilized vegetation areas are disturbed by subsequent construction, adverse weather, traffic, or other cause, scarify surface, re-shape, and apply mulch and vegetation to required coverages prior to further construction.

### 3.8 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. General: Dispose of material in a manner acceptable to the Owner and in a manner that will not adversely impact the environment.
- B. Disposal of Excess Excavation: Transport excess excavated material, including unsatisfactory soil material, to any designated spoil areas, and spread as specified; otherwise remove from the project work area and legally dispose of such material which cannot be acceptably distributed within the project work area.
- C. Disposal of Waste Material: Remove trash, debris, and waste materials from the project Work area and legally dispose of such material.
- D. Unless provided for on the Bid form, no additional payment will be made for maintenance and disposal work, whether unavoidable due to project location or due to Contractor negligence.

### 3.9 TERMINATION AND REMOVAL

- A. Unless the Engineer request that it be maintained longer, remove temporary devices when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Final Acceptance. Place silts and deposits removed from control barriers in eroded areas and replant.
- B. Materials and facilities that constitute temporary devices are the property of the Contractor.

END OF SECTION

**SECTION 016000 - PRODUCT REQUIREMENTS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.2 RELATED REQUIREMENTS**

- A. Section 012500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- B. Section 014000 - Quality Requirements: Product quality monitoring.
- C. Section 017419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

**1.3 DEFINITIONS**

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. Comparable or Equivalent Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product", including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
  - 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section and title and Drawing numbers and titles.

- 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in submittal procedures of Section 013000 "Administrative Requirements".

#### 1.4 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

#### 1.5 QUALITY ASSURANCE

- A. Product Compatibility: In the event that the Contractor has the option of using two or more products on the Project, the Contractor shall select products compatible with products previously selected. Products selected shall be compatible with previously selected products even if previously selected products were also options.

#### 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or enclosed by a manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by a manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
  - 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

### PART 2 PRODUCTS

#### 2.1 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

#### 2.2 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.

- B. See Section 014000 - Quality Requirements, for additional source quality control requirements.
- C. Use of products having any of the following characteristics is not permitted:
  1. Made using or containing CFC's or HCFC's.
  2. Containing lead, cadmium, or asbestos.

2.3 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products and types that have been produced and used successfully in similar situations on other products.
  3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Engineer/Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
  1. Limited List of Procedures: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
    - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
  2. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
    - a. Non-Limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
    - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
  3. Limited List of Manufacturers: Where Specifications include a list of manufacturer's names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.
    - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
  4. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
    - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
    - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
  5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or

indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- C. Visual Matching Specification: Where Specifications require the phrase "match Engineer's/Architect's sample," provide a product that complies with requirements and matches Engineer's/Architect's sample. Engineer's/Architect's decision will be final on whether a proposed product matches.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Engineer/Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Engineer/Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.4 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

## 2.5 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Engineer/Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer/Architect may return requests without action, except to record noncompliance with the following requirements:
  1. Evidence that the proposed product will result on a cost savings to the Owner.
  2. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
  3. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual and aesthetic characteristics, and other specific features and requirements.
  4. Evidence that proposed product provides specified warranty.
  5. List of similar installations for completed projects, with project names and addresses and names and addresses of Engineers/Architects and Owners, if requested.
  6. Samples, if requested.
  7. Evidence that the equivalent product proposed is required due to specified product being discontinued or not available.
- B. Engineer's/Architect's decision in Comparable Products Submittal: If necessary, Engineer/Architect will request additional information or documentation for evaluation, as specified in Section 013000 "Administrative Requirements".
  1. Form of Approval of Submittal: As specified in Section 013000 "Administrative Requirements".
  2. Use product specified if Engineer/Architect does not issue a decision on use of a comparable product request within time allocated but not less than 30 days.
- C. Submittal Requirements, Two-Step Process: Approval by the Engineer/Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

## PART 3 EXECUTION

### 3.1 SUBSTITUTION LIMITATIONS

- A. See Section 012500 - Substitution Procedures.



### 3.2 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### 3.3 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Do not store products directly on the ground.
- J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- K. Prevent contact with material that may cause corrosion, discoloration, or staining.
- L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

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**SECTION 017000 - EXECUTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Field Engineering
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.

**1.2 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 013000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 014000 - Quality Requirements: Testing and inspection procedures.
- D. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures, heating, cooling, and ventilating facilities.
- E. Section 015630-Temporary Erosion and Sediment Control: Additional erosion and sediment control requirements.
- F. Section 017419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
- G. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- H. Section 017900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- I. Section 024100 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- J. Section 019113 - General Commissioning Requirements.
- K. Section 078400 - Firestopping.
- L. Individual Product Specification Sections:
  - 1. Advance notification to other sections of openings required in work of those sections.
  - 2. Limitations on cutting structural members.

**1.3 REFERENCE STANDARDS**

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2019.

**1.4 DEFINITIONS**

- A. Cutting: Removal of constructed elements in order to permit performance of subsequent work.
- B. Patching: Repair work to restore construction to original conditions after performance of subsequent work.

**1.5 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
  - 1. Submit qualification data for Surveyor.
  - 2. On request, submit documentation verifying accuracy of survey work.
  - 3. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
  - 4. Submit surveys and survey logs for the project record.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
  - 2. Identify demolition firm and submit qualifications.
  - 3. Include a summary of safety procedures.
- D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate Contractor.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities.

#### 1.6 QUALITY ASSURANCE

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Engineer. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Cutting and Patching: Comply with the following requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: Notify Engineer of locations of cutting and await Engineer's direction before proceeding with cutting and patching structural elements or elements whose structural function is no known. During cutting and patching, support, brace, and shore structural elements. Cutting and patching of structural elements shall not change their load-carrying capacity or deflection.
  - 2. Operational Elements: Do not cut and patch operating elements in a manner that will reduce performance, increase maintenance, decrease operational life, or decrease safety.
  - 3. Other Construction Elements: Do not cut and patch other construction elements in a manner that will reduce load-carrying capacity, reduce performance, increase maintenance, decrease operational life, or decrease safety.
  - 4. Visual Elements: Do not cut and patch construction elements in a manner that results in visual evidence of cutting and patching or reduces the building's aesthetic qualities. Any construction that has been patched in a visually unsatisfactory manner will be removed and replaced.

#### 1.7 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Perform dewatering activities, as required, for the duration of the project.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Comply with materials requirements that are specified in other Sections.
- B. Patching Materials:
  1. New Materials: As specified in product sections; match existing products and work for patching and extending work.
  2. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
  3. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.
- C. Cleaning Materials:
  1. Use materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned.
  2. Do not use materials and agents that might damage finished surfaces or are potentially hazardous to health or property.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions:
  1. Before construction begins, verify the locations and existence of underground utilities and other construction affecting the completion of the Work.
  2. The existence or location of any underground utilities and construction identified in the contract documents is not guaranteed.
  3. Before construction, for all points of connection of underground utilities, verify the location and invert elevations.
  4. If work must be completed by utilities serving Project site, provide the location data for the related work.
- B. Examination and Acceptance of Conditions:
  1. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work.
  2. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
  3. Examine and verify specific conditions described in individual specification sections.
  4. Take field measurements before confirming product orders, installation or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- C. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### 3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.

- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

### 3.3 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.
  - 3. Review areas of potential interference and conflict. Resolve potential issues before proceeding.
- E. Record minutes and distribute copies within two days after meeting to participants, with electronic copies to Engineer, Owner, participants, and those affected by decisions made.

### 3.4 LAYING OUT THE WORK

- A. Verify locations of survey control points, existing benchmarks, and existing conditions prior to starting work.
- B. Promptly notify Engineer of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.
- F. Utilize recognized engineering survey practices.
- G. Engage a land surveyor to establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Building foundation, column locations, ground floor elevations.
  - 4. Controlling lines and levels required for mechanical and electrical trades.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.
- J. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

### 3.5 FIELD ENGINEERING

- A. Identification: Property corners, control points, and existing benchmarks will be identified by Owner.
- B. Reference Points: Before beginning the Work, locate existing permanent reference points including but not limited to benchmarks and control points.
  - 1. Written approval of Engineer is required to change or relocated existing benchmarks and control points. Promptly report lost or destroyed permanent benchmarks and control points. Before proceeding, report the need to relocate permanent benchmarks or control points.

2. Promptly replace lost or destroyed benchmarks and control points. Base replacements on the original survey.
- C. Benchmarks: Establish and maintain two permanent benchmarks on Project site based on original survey.
  1. Record benchmarks' horizontal and vertical data on Project Record Documents.
  2. Provide a temporary reference point sufficient to locate the Work where the actual location or elevation cannot be marked.
  3. Remove temporary points when no longer needed.
- D. Certified Survey: Prepare a certified survey showing dimensions, locations, angle, and elevations of construction and site work on completion of foundation walls, major site improvements, and other work requiring field engineering.

### 3.6 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Install components in order to maximize available space for maintenance and replacement where such space is limited.
- E. Conceal wiring, ducts, and pipes in finished areas, unless otherwise indicated.
- F. In occupied spaces, a minimum headroom clearance of 96 inches is to be maintained, unless otherwise indicated. In unoccupied spaces, a minimum headroom clearance of 90 inches is to be maintained, unless otherwise indicated.
- G. Ensure satisfactory results by installation products at an appropriate time and under appropriate conditions, as judged by Engineer.
- H. Throughout construction operations, ensure no part of the work is subjected to damaging activities or loading in excess of that expected during the normal occupancy of the Project.
- I. Maintain adequate clearances and sequence the Work to accommodate movement of construction items on-site and placement in permanent locations.
- J. Use tools or equipment that minimizes excessive noise levels.
- K. For Work specified as pre-fabricated and field installed, provide templates to all parties involved with the installation. Ensure adequate provisions for installing products to comply with requirements are included in Shop Drawings.
- L. Verify size and type of attachments required for load conditions with manufacturer where size and type are not indicated.
- M. Mount components at heights directed by Engineer where mounting heights are not indicated.
- N. Allow for building movement, including thermal contraction and expansion.
- O. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- P. Make neat transitions between different surfaces, maintaining texture and appearance.
- Q. Joints shall be uniform width. Arrange joints for the best visual effect, as judged by Engineer, where joint locations in exposed Work are not indicated.
- R. Remove and replace or repair damaged, defective, or non-conforming Work.

### 3.7 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching. When necessary, complete cutting and patching at the earliest feasible time.

- B. Perform whatever cutting and patching is necessary to:
  1. Complete the work.
  2. Fit products together to integrate with other work.
  3. Provide openings for penetration of mechanical, electrical, and other services.
  4. Match work that has been cut to adjacent work.
  5. Repair areas adjacent to cuts to required condition.
  6. Repair new work damaged by subsequent work.
  7. Remove samples of installed work for testing when requested.
  8. Remove and replace defective and non-complying work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Execute work by methods and with materials so as to not void any existing warranties.
- E. Provide temporary support of work to be cut as needed.
- F. Provide protection to in-place construction from damage and adverse weather during cutting and patching.
- G. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- H. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- I. Restore work with new products in accordance with requirements of Contract Documents.
- J. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- K. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.
- L. Patching:
  1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  2. Match color, texture, and appearance.
  3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### 3.8 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Keep in-place construction clean. Use means and materials specified by manufacturer or fabricator of product being cleaned. If no means and materials are specified, use means and materials that will not damage the surface and are not hazardous to health or property.
- D. Clean Work areas to the level of cleanliness required to properly execute the work.
  1. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- E. Collect and remove waste materials, debris, and trash/rubbish from site daily and dispose of off-site in a lawful manner; do not burn, bury, or wash into sewers or waterways.



1. Containerize hazardous and unsanitary waste material in appropriately marked and suitable containers separate from other waste. Dispose of legally.
2. When removing combustible waste, comply with NFPA 241.

### 3.9 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
- G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- H. Maintain temperature and relative humidity according to manufacturer's written instructions.
- I. Prohibit traffic from landscaped areas.
- J. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.
- K. Repair previously completed and subsequently damaged Work to like-new condition.

### 3.10 SYSTEM STARTUP

- A. Coordinate with requirements of Section 019113 - General Commissioning Requirements.
- B. Coordinate schedule for start-up of various equipment and systems.
- C. Notify Engineer and Owner seven days prior to start-up of each item.
- D. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- E. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- F. Verify that wiring and support components for equipment are complete and tested.
- G. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- H. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- I. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### 3.11 DEMONSTRATION AND INSTRUCTION

- A. See Section 017900 - Demonstration and Training.

### 3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 230593 - Testing, Adjusting, and Balancing for HVAC.

### 3.13 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
  - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- J. Clean Owner-occupied areas of work.

END OF SECTION

**SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL****PART 1 GENERAL****1.1 WASTE MANAGEMENT REQUIREMENTS**

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- E. Methods of trash/waste disposal that are not acceptable are:
  - 1. Burning on the project site.
  - 2. Burying on the project site.
  - 3. Dumping or burying on other property, public or private.
  - 4. Other illegal dumping or burying.
- F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

**1.2 DEFINITIONS**

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

### 1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
  - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
  - 2. Submit Report on a form acceptable to Owner.
  - 3. Landfill Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project disposed of in landfills.
    - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
  - 4. Incinerator Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project delivered to incinerators.
    - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
  - 5. Recycled and Salvaged Materials: Include the following information for each:
    - a. Identification of material, including those retrieved by installer for use on other projects.
    - b. Amount, in tons or cubic yards (cubic meters), date removed from the project site, and receiving party.
    - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
    - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
  - 6. Material Reused on Project: Include the following information for each:
    - a. Identification of material and how it was used in the project.
    - b. Amount, in tons or cubic yards (cubic meters).
    - c. Include weight tickets as evidence of quantity.
  - 7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

## PART 3 EXECUTION

### 2.1 WASTE MANAGEMENT PROCEDURES

- A. See Section 013000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 015000 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 016000 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 017000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

### 2.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Engineer.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
  - 1. Prebid meeting.
  - 2. Preconstruction meeting.
  - 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
  - 1. Provide containers as required.
  - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
  - 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

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**SECTION 017800 - CLOSEOUT SUBMITTALS**

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

## 1.2 RELATED REQUIREMENTS

- A. Section 007000 - General Conditions and 008000 - Supplementary Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 017000 - Execution: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

## 1.3 SUBMITTALS

- A. Project Record Documents: Submit one paper copy and one electronic pdf copy of the documents to Engineer with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. Submit one electronic pdf copy of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one electronic pdf with comments.
  - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 3. Submit one paper copy and one electronic pdf copy of completed documents 15 days prior to inspection for final completion. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
  - 4. Submit two paper copies and one electronic pdf copy of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

## PART 2 PRODUCTS - Not Used

## PART 3 EXECUTION

## 3.1 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.

2. Specifications.
  3. Addenda.
  4. Change Orders and other modifications to the Contract.
  5. Reviewed shop drawings, product data, and samples.
  6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
  - C. Submit report detailing information incorporated into the Project Record Documents including revisions, concealed conditions, field changes, product selections, and other notations incorporated.
  - D. Store record documents separate from documents used for construction.
  - E. Record information concurrent with construction progress.
  - F. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
    1. Manufacturer's name and product model and number.
    2. Product substitutions or alternates utilized.
    3. Changes made by Addenda and modifications.
  - G. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
    1. Measured depths of foundations in relation to finish first floor datum.
    2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
    3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
    4. Field changes of dimension and detail.
    5. Details not on original Contract drawings.

### 3.2 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

### 3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
  1. Product data, with catalog number, size, composition, and color and texture designations.
  2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.



- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### 3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
  - 1. Description of unit or system, and component parts.
  - 2. Identify function, normal operating characteristics, and limiting conditions.
  - 3. Include performance curves, with engineering data and tests.
  - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
  - 1. Include HVAC outdoor and exhaust air damper calibration strategy.
    - a. Include provisions which ensure that full closure of dampers can be achieved.
  - 2. Include Carbon Dioxide Monitoring Protocol.
  - 3. Include Carbon Monoxide Monitoring Protocol.
  - 4. Include Frost Mitigation Strategy for ventilation heat-recovery system.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide control diagrams by controls manufacturer as installed.
- L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- O. Include test and balancing reports.
- P. Additional Requirements: As specified in individual product specification sections.

### 3.5 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Engineer, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
  - 1. Project Directory.
  - 2. Table of Contents, of all volumes, and of this volume.
  - 3. Operation and Maintenance Data: Arranged by system, then by product category.
    - a. Source data.
    - b. Product data, shop drawings, and other submittals.
    - c. Operation and maintenance data.
    - d. Field quality control data.
    - e. Photocopies of warranties and bonds.

### 3.6 WARRANTIES AND BONDS

- A. Submit warranties and bonds, properly executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 15 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 Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in heavy-duty 8-1/2 by 11 inch (216 by 279 mm) three D side ring binders with durable plastic covers as necessary to accommodate contents.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

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**SECTION 017900 - DEMONSTRATION AND TRAINING****PART 1 GENERAL****1.1 SUMMARY**

- A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
- B. Training of personnel in operation and maintenance is required for:
  - 1. All software-operated systems.
  - 2. HVAC systems and equipment.
  - 3. Plumbing equipment.
  - 4. Electrical systems and equipment.
  - 5. Pumping and chemical feed systems and equipment.
  - 6. Crane and hoisting systems and equipment.
  - 7. Membrane filtration systems and equipment.
  - 8. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
  - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
  - 2. Finishes, including flooring, wall finishes, ceiling finishes.
  - 3. Fixtures and fittings.
  - 4. Items specified in individual product Sections.

**1.2 RELATED REQUIREMENTS**

- A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.
- B. Section 019113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.
- C. Other Specification Sections: Additional requirements for demonstration and training.

**1.3 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
  - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Owner and Engineer.
  - 2. Submit one copy to the Owner and Engineer, not to be returned.
  - 3. Submittals indicated as "Draft" are intended for the use of the Owner and Engineer in review of overall Training Plan; submit in editable electronic format, Microsoft Word preferred.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit to Engineer for transmittal to Owner.
  - 2. Submit not less than four weeks prior to start of training.
  - 3. Revise and resubmit until acceptable.
  - 4. Provide an overall schedule showing all training sessions.
  - 5. Include at least the following for each training session:
    - a. Identification, date, time, and duration.
    - b. Description of products and/or systems to be covered.
    - c. Name of firm and person conducting training; include qualifications.

- d. Intended audience, such as job description.
  - e. Objectives of training and suggested methods of ensuring adequate training.
  - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
  - g. Media to be used, such a slides, hand-outs, etc.
  - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
- 1. Include applicable portion of O&M manuals.
  - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
  - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
- 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
  - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION

##### 3.1 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
- 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
  - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
- 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

##### 3.2 TRAINING - GENERAL

- A. Owner and Engineer will prepare the Training Plan based on draft plans submitted.
- B. Conduct training on-site unless otherwise indicated.
- C. Owner will provide classroom and seating at no cost to Contractor.
- D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Owner and Engineer.

- E. Provide training in minimum two hour segments.
- F. The Owner and Engineer is responsible for determining that the training was satisfactorily completed and will provide approval forms.
- G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  - 3. Typical uses of the O&M manuals.
- I. Product- and System-Specific Training:
  - 1. Review the applicable O&M manuals.
  - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
  - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  - 6. Discuss common troubleshooting problems and solutions.
  - 7. Discuss any peculiarities of equipment installation or operation.
  - 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  - 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  - 10. Review spare parts and tools required to be furnished by Contractor.
  - 11. Review spare parts suppliers and sources and procurement procedures.
- J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

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**SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS**

## PART 1 GENERAL

## 1.1 SUMMARY

- A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
1. Verify that the work is installed in accordance with Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
  2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests executed by Contractor and witnessed by the Owner and Engineer are utilized to achieve this.
  3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
  4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.
- B. The Owner and Engineer directs and coordinates all commissioning activities; this section describes some but not all of the Owner and Engineer's commissioning responsibilities.

## 1.2 SCOPE OF COMMISSIONING

- A. The following are to be commissioned:
1. Fire Protection Systems.
  2. Plumbing Systems: Water heaters.
  3. HVAC Systems, Including:
    - a. Major and minor equipment items.
    - b. Piping Systems and equipment.
    - c. Ductwork and accessories.
    - d. Control System.
  4. Special Ventilation: Fume hoods.
  5. Electrical Systems:
    - a. Power quality.
    - b. Emergency power systems.
    - c. Lighting controls and other manual switches.
  6. Electronic Safety and Security:
    - a. Security system, including doors and hardware.
    - b. Fire and smoke alarms.
  7. Chemical Storage and Feed Systems and Equipment for all Chemicals.
  8. Membrane Filtration Systems and Equipment, including instrumentation and control systems.
  9. Pumping Equipment and Systems, including:
    - a. Motors and Variable Speed Drives.
    - b. Motor Starters and Controls.
    - c. Pump Control Valves and Accessories.
  10. Crane and Hoist Equipment and Systems, including controls.

### 1.3 RELATED REQUIREMENTS

- A. Section 017000 - Execution: General startup requirements.
- B. Section 017800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.
- C. Section 017900 - Demonstration and Training: Scope and procedures for Owner personnel training.

### 1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
  - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Owner and Engineer, unless they require review by Engineer; in that case, submit to Engineer first.
  - 2. Submit one copy to the Owner and Engineer, not to be returned.
  - 3. Submittals indicated as "Draft" are intended for the use of the Owner and Engineer in review of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word preferred.
- B. Product Data: If submittals to Engineer do not include the following, submit copies as soon as possible:
  - 1. Manufacturer's product data, cut sheets, and shop drawings.
  - 2. Manufacturer's installation instructions.
  - 3. Startup, operating, and troubleshooting procedures.
  - 4. Fan and pump curves.
  - 5. Factory test reports.
  - 6. Warranty information, including details of Owner's responsibilities in regard to keeping warranties in force.
- C. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.
- D. Startup Plans and Reports.
- E. Completed Prefunctional Checklists.

## PART 2 PRODUCTS

### 2.1 TEST EQUIPMENT

- A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
- B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:
  - 1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F (0.3 degree C) and resolution of plus/minus 0.1 degree F (0.05 degree C).
  - 2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
  - 3. Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.
- C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in

order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

- D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
  - 1. Dataloggers required for Functional Tests will be provided by the Contractor and will not become the property of Owner.

## PART 3 EXECUTION

### 3.1 COMMISSIONING PLAN

- A. Contractor will prepare the Commissioning Plan in coordination and approval from the Owner, Engineer, and specific Vendors for the applicable equipment and system.
  - 1. Attend meetings called by the Owner and Engineer for purposes of completing the commissioning plan.
  - 2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.
- B. Contractor is responsible for compliance with the Commissioning Plan.
- C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.
  - 1. Commissioning will be phased to minimize total construction time.
- D. Commissioning Schedule:
  - 1. Submit anticipated dates of startup of each item of equipment and system to Owner and Engineer within 120 days after issuance of the Notice To Proceed.
  - 2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.
  - 3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
  - 4. Provide sufficient notice to Owner and Engineer for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

### 3.2 STARTUP PLANS AND REPORTS

- A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.
- B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.
- C. Submit directly to the Owner and Engineer.

### 3.3 PREFUNCTIONAL CHECKLISTS

- A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.
  - 1. No sampling of identical or near-identical items is allowed.
  - 2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
  - 3. The following types of information will be gathered via the completed Checklist forms:
    - a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
    - b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.

- c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
  - d. Serial number of installed unit.
  - e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.
  - f. Sensor and actuator calibration information.
- B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Owner and Engineer is not required unless otherwise specified.
- 1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
  - 2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
  - 3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
  - 4. If any Checklist line item is not relevant, record reasons on the form.
  - 5. Contractor may independently perform startup inspections and/or tests, at Contractor's option.
  - 6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
  - 7. Submit completed Checklists to Owner and Engineer within two days of completion.
- C. Contractor is responsible for furnishing the Prefunctional Checklists to the Owner and Engineer.
- 1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist indicated in Contract Documents.
  - 2. Provide all additional information requested by Owner and Engineer to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.
  - 3. Owner and Engineer may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in Contract Documents or not.
- D. Owner and Engineer Witnessing: Required for:
- 1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.
  - 2. A sampling of non-primary equipment, as allowed by the commissioning plan.
- E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.
- 1. If difficulty in correction would delay progress, report deficiency to the Owner and Engineer immediately.

### 3.4 FUNCTIONAL TESTS

- A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.

- B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.
- C. Owner and Engineer is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.
- D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Owner and Engineer will document the deficiency and the Contractor's stated intentions regarding correction.
  - 1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
  - 2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Owner and Engineer; the Owner and Engineer will reschedule the test and the Contractor shall re-test.
  - 3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
  - 4. Contractor shall bear the cost of Owner and Engineer personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.
- E. Functional Test Procedures:
  - 1. Some test procedures are included in Contract Documents; where Functional Test procedures are not included in Contract Documents, test procedures will be determined by the Owner and Engineer with input by and coordination with Contractor.
  - 2. Examples of Functional Testing:
    - a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).
    - b. 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.
    - c. Systems are run through all the HVAC control system's sequences of operation and components are verified to be responding as the sequence's state.
    - d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Owner and Engineer is Functional Testing.
- F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

### 3.5 SENSOR AND ACTUATOR CALIBRATION

- A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
- B. Calibrate using the methods described below; alternate methods may be used, if approved by Owner and Engineer beforehand. See PART 2 for test instrument requirements.

Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:

1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
2. Verify that sensors with shielded cable are grounded only at one end.
3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F (0.1 degree C) of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
4. Tolerances for critical applications may be tighter.

D. Sensors Without Transmitters - Standard Application:

1. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
2. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
3. If not, install offset, calibrate or replace sensor.

E. Sensors With Transmitters - Standard Application.

1. Disconnect sensor.
2. Connect a signal generator in place of sensor.
3. Connect ammeter in series between transmitter and building automation or treatment process system control panel.
4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.
5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation or treatment process system.
7. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
8. Reconnect sensor.
9. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
10. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
11. If not, replace sensor and repeat.
12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:

1. Watthour, Voltage, Amperage: 1 percent of design.
2. Pressure, Air, Water, Gas: 3 percent of design.
3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F (0.2 degree C).
4. Relative Humidity: 4 percent of design.
5. Barometric Pressure: 0.1 inch of Hg (340 Pa).
6. Flow Rate, Air: 10 percent of design.

7. Flow Rate, Water: 4 percent of design.
  8. AHU Wet Bulb and Dew Point: 2.0 degrees F (1.1 degrees C).
- G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.
- H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
  2. Set pump/fan to normal operating mode.
  3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
  4. Command valve/damper to open; verify position is full open and adjust output signal as required.
  5. Command valve/damper to a few intermediate positions.
  6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.
  2. Use an ultra-sonic flow meter to detect flow or leakage.

### 3.6 TEST PROCEDURES - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
  2. Sampling is not allowed for:
    - a. Major equipment.
    - b. Life-safety-critical equipment.
    - c. Prefunctional Checklist execution.
  3. Randomly test at least 25 percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."
  4. If 20 percent of the units in the first sample fail, test another 25 percent of the remaining identical units.
  5. If 20 percent of the units in the second sample fail, test all remaining identical units.
  6. If frequent failures occur, resulting in more troubleshooting than testing, the Owner and Engineer may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.
- D. Manual Testing: Use 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").
- E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to

see the response in a VAV box.

- F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
- G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.
- H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.
- I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
  - 1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Owner and Engineer's request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
  - 2. Other points will be monitored by the Owner and Engineer using dataloggers.
  - 3. At the option of the Owner and Engineer, some control system monitoring may be replaced with datalogger monitoring.
  - 4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
  - 5. Graphical output is desirable and is required for all output if the system can produce it.
  - 6. Monitoring may be used to augment manual testing.

### 3.7 OPERATION AND MAINTENANCE MANUALS

- A. See Section 017800 - Closeout Submittals for additional requirements.
- B. Submit manuals related to items that were commissioned to Owner and Engineer for review; make changes recommended by Owner and Engineer.
- C. Owner and Engineer will add commissioning records to manuals after submission to Owner.

END OF SECTION



**SECTION 024100 - DEMOLITION****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Building demolition excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of built site elements.
- C. Selective demolition of building elements for alteration purposes.
- D. Demolition and Removal of selected site elements.

**1.2 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 011000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- C. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 015630 - Temporary Erosion and Sediment Control.
- E. Section 016000 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- F. Section 017000 - Execution: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- G. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
- H. Section 311000 - Site Clearing: Vegetation and existing debris removal.
- I. Section 312200 - Grading: Topsoil removal.
- J. Section 312200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- K. Section 312323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

**1.3 DEFINITIONS**

- A. Demolition: Demolition is the process of wrecking or taking out any load-supporting structural member of a facility together with any related handling and disposal operations.
- B. Demolish: Completely remove and legally dispose of off-site.
- C. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.
- D. Remove: Detach items from existing site and legally dispose of them off-site unless indicated to be salvaged.
- E. Remove and Salvage: Detach items from existing site, in a manner to prevent damage, and deliver to Owner ready for reuse.

**1.4 MATERIAL OWNERSHIP**

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

**1.5 PREINSTALLATION MEETINGS**

- A. Predemolition Conference: Conduct conference at Project site.
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid

delays.

4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

#### 1.6 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2019.

#### 1.7 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
  1. Vegetation to be protected.
  2. Areas for temporary construction and field offices.
  3. Areas for temporary and permanent placement of removed materials.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
  2. Identify demolition firm and submit qualifications.
  3. Include a summary of safety procedures.
  4. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site utility services are uninterrupted.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

#### 1.8 FIELD CONDITIONS

- A. Owner will occupy portions of Site immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  1. If suspected hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  1. Maintain fire-protection facilities in service during selective demolition operations.

#### 1.9 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.11 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
  - 1. Comply with requirements specified in Section 013233.
  - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 SCOPE

- A. Remove portions of the existing raw water pump station as shown on the Drawings.
- B. Remove the entire existing masonry building designated on the water works site plan.
- C. Remove existing timber power poles, paving, curbs, and fencing as required to accomplish new work.
- D. Remove other items indicated.
- E. Fill excavations, open pits, and holes in ground areas generated as a result of removals, using specified fill; compact fill as specified in Section 312200.

3.3 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with other requirements specified in Section 017000.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Comply with applicable requirements of NFPA 241.
  - 3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 4. Provide, erect, and maintain temporary barriers and security devices.
  - 5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

7. Do not close or obstruct roadways or sidewalks without permit.
  8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
  9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- C. Do not begin removal until receipt of notification to proceed from Owner.
  - D. Do not begin removal until built elements to be salvaged or relocated have been removed.
  - E. Protect existing structures and other elements that are not to be removed.
    1. Provide bracing and shoring.
    2. Prevent movement or settlement of adjacent structures.
    3. Stop work immediately if adjacent structures appear to be in danger.
  - F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
  - G. Relics, antiques, and other historic items uncovered during demolition remain property of the owner. These items may include, but are not limited to, commemorative plaques, tablets, and cornerstones and their contents.
    1. Salvage carefully and in a manner that prevents damage then return the item to Owner.
  - H. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
  - I. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

### 3.4 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

### 3.5 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  1. Verify that construction and utility arrangements are as indicated.
  2. Report discrepancies to Engineer before disturbing existing installation.
  3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

- B. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove items indicated on drawings.
- C. Services (Including but not limited to Electrical): Remove existing systems and equipment as indicated.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
  - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  - 3. Verify that abandoned services serve only abandoned facilities before removal.
  - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- D. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
  - 4. Patch as specified for patching new work.

3.6 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
  - 1. Do not allow debris, junk, or trash to accumulate on-site.
  - 2. Remove and transport demolished material in a manner where spillage does not occur on surrounding surfaces and areas.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.
- E. Do not burn demolished materials.

END OF SECTION

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**SECTION 031000 - CONCRETE FORMWORK**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section includes the design and erection of formwork, shoring and reshoring for cast-in-place concrete and accessories.

1.2 RELATED SECTIONS

- A. Section 013330 - Structural Submittals.
- B. Section 032000 - Concrete Reinforcement.
- C. Section 033000 - Cast-in-Place Concrete.

1.3 REFERENCES

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 - Standard Specifications for Structural Concrete.
- C. ACI 318 - Building Code Requirements for Structural Concrete.
- D. ACI 347 - Recommended Practice for Concrete Formwork.
- E. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- F. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.4 SUBMITTALS

- A. Submit locations of construction joints for approval.
- B. Submit manufacturer's data for waterstops, formwork accessories, inserts, form release agent, and isolation joint filler.

1.5 DESIGN OF FORMWORK

- A. Design of formwork, shoring, and reshoring and its removal is the Contractor's responsibility.
- B. Design of formwork, shoring, and reshoring shall conform to ACI 117, ACI 301, ACI 318, and ACI 347.
- C. Design formwork in a manner such that existing or new construction is not overloaded.
- D. Do not remove shores or reshores earlier than recommended by ACI 301 and ACI 347.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Construct forms with wood, plywood, metal, fiberglass or a combination of these.
- B. Form materials shall have sufficient strength to prevent distortion.

2.2 FORMWORK ACCESSORIES

- A. Formwork accessories that are embedded in concrete, including ties and hangers, shall be commercially manufactured products. Do not use nonfabricated wire form ties.

2.3 FORM RELEASE AGENT

- A. Form release agent shall not bond with, stain, nor adversely affect concrete surfaces.

2.4 WATERSTOPS

- A. Waterstops at construction joints and control joints indicated by the Drawings shall be sized to suit the joints.
- B. Waterstops shall be flat dumbbell type or centerbulb type at control joints where shown on drawings.
- C. Waterstops shall be preformed plastic adhesive waterstops at cold joints in concrete where shown on the drawings.

2.5 DOVETAIL ANCHORS

- A. Dovetail anchors shall consist of 24 gage galvanized steel dovetail anchoring slots with filler strips and 16 gage galvanized dovetail anchors, unless otherwise noted on Drawings.

2.6 VAPOR BARRIER

- A. Vapor barrier shall consist of polyethylene sheet, not less than ten mils thick.

2.7 ISOLATION JOINT FILLER

- A. Asphalt impregnated premolded fiberboard isolation joint filler shall conform with ASTM D1751 and be 1/2-inch thick by full thickness of slab or joint, unless indicated otherwise on the Drawings.

2.8 CONSTRUCTION JOINTS

- A. Provide key type steel forms by Vulcan screed joints, Burke Keyed Kold joint form or Form-A-Key.

PART 3 EXECUTION

3.1 GENERAL

- A. Erect formwork in accordance with ACI 301, ACI 318, and ACI 347.



- B. Maintain formwork and shoring to support loads until such loads can be supported by concrete structure.

### 3.2 TOLERANCES

- A. Finished work shall comply with ACI 117 tolerances.

### 3.3 CAMBER

- A. Camber formwork for slabs and beams to compensate for anticipated deflections in formwork prior to hardening of concrete to maintain tolerances specified by ACI 117.
- B. Set screeds to a like camber to maintain specified concrete thickness.

### 3.4 SURFACE PREPARATION

- A. For concrete exposed to view, seal form joints to prevent leakage.
- B. Before reinforcement is placed, coat contact surfaces of form with form release agent in accordance with manufacturer's recommendations. Do not allow excess form release agent to accumulate in forms or come in contact with concrete surfaces against which fresh concrete will be placed.

### 3.5 CHAMFERS

- A. Provide 3/4-inch chamfer at all corners.

### 3.6 FOUNDATION ELEMENTS

- A. Form foundation elements if soil or other conditions are such that earth trench forms are unsuitable.
- B. Sides of exterior foundation walls and turned-down slabs shall be formed.
- C. Maintain minimum coverage of reinforcing steel as indicated on Structural Drawings.

### 3.7 INSERTS

- A. Install and secure in position required inserts, hangers, sleeves, anchors, and nailers.
- B. Locate anchor bolts by using templates with two nuts to secure in position.

### 3.8 EMBEDS

- A. Set and secure embedded plates, bearing plates, and anchor bolts in accordance with approved setting drawings and in such a manner to prevent displacement during placement of concrete.

### 3.9 DOVETAILS

- A. Install continuous vertical dovetail anchoring slots with filler strips at intersections of concrete and masonry walls unless indicated otherwise by the Drawings.

### 3.10 VAPOR BARRIER

- A. Where indicated on Drawings, place vapor barrier over sewer, piping, and granular subbase, but below conduits and ducts, and behind insulation and expansion joints at sidewalls.
- B. Lap vapor barrier six inches minimum at splices.
- C. Do not puncture vapor barrier.

### 3.11 FORM REMOVAL

- A. Remove forms carefully in such manner and at such time as to ensure complete safety of structure. Do not remove forms shoring, or reshoring until members have acquired sufficient strength to support their weight and the load thereon safely.

### 3.12 PROVISIONS FOR OTHER TRADES

- A. Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings and recesses from trades providing such items.
- B. Accurately place and securely support items built into forms. Obtain approval for openings not shown on Drawings.

### 3.13 CLEANING

- A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed.

### 3.14 FORM SURFACES

- A. Coat contact surfaces of forms with a form coating compound before reinforcement is placed. Apply in accordance with manufacturer's recommendations. Rust-stained steel formwork is not acceptable.

### 3.15 CONSTRUCTION JOINTS

- A. Provide construction joints in accordance with ACI 318.
- B. Obtain Design Professional's prior approval for use and location of joints.
- C. Provide 1-1/2 inch deep key type construction joints at end of each placement for slabs, beams, walls, and footings. Bevel forms for easy removal.
- D. Remove loose particles and latency from surface prior to placing the next lift. Chip the surface to a depth sufficient to expose sound concrete.

END OF SECTION

**SECTION 032000 - CONCRETE REINFORCEMENT**

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Section 013330 - Structural Submittals.
- B. Section 014525 - Structural Testing/Inspection Agency Services.
- C. Section 031000 - Concrete Formwork.
- D. Section 033000 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 - Standard Specifications for Structural Concrete.
- C. ACI 315 - Details and Detailing of Concrete Reinforcement.
- D. ACI 318 - Building Code Requirements for Structural Concrete.
- E. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete Reinforcement.
- F. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- G. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
- H. AWS D12.1 - Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.
- I. AWS D1.4 - Structural Weld Code - Reinforcing Steel.
- J. CRSI - Manual of Practice, and Documents 63 and 65.

1.3 SUBMITTALS

- A. Submit shop drawings as follows:
  - 1. Notify Design Professional prior to detailing reinforcing steel shop drawings.
  - 2. Indicate size, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splice lengths, stirrup spacing, supporting and spacing devices. Detail reinforcing steel in accordance with ACI 315 and CRSI Standards.
  - 3. Written description of reinforcement without adequate sections, elevations, and details is not acceptable.
  - 4. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.

- B. Submit a certification from each manufacturer or supplier stating that materials meet the requirements of the ASTM and ACI standards referenced.
- C. Submit mill test reports.
- D. Submit manufacturer's data for tensile and compressive splicers.
- E. Submit manufacturer's data including installation recommendations for dowel adhesive.

#### 1.4 QUALITY ASSURANCE

- A. Coordinate and schedule in a timely manner with the Structural Testing/Inspection Agency the following quality related items:
  - 1. Verify reinforcing steel for quantity, size, location, and support.
  - 2. Verify proper reinforcing steel concrete coverage.
- B. The Structural Testing / Inspection Agency shall provide special inspections as required by Chapter 17 of the building code as required by Specification 01 4525.

#### 1.5 STORAGE AND PROTECTING

- A. Store reinforcing steel above ground so that it remains clean. Maintain steel surfaces free from materials and coatings which might impair bond.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

- A. Deformed reinforcing steel shall conform to ASTM A615, refer to Structural Drawings for grade (Grade 60 minimum).
- B. Welded steel wire fabric shall conform to ASTM A1064.

#### 2.2 ACCESSORY MATERIALS

- A. Annealed steel tie wire shall be 16-1/2 gage minimum.
- B. Bar supports shall be plastic-tipped steel Class I bar supports conforming to CRSI Specifications. Concrete brick may be used to support reinforcement to obtain proper clearance from earth.

#### 2.3 SPLICERS

- A. Tensile splicers shall be capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength.
- B. Compression splicers shall be the mechanical type such that the compression stress is transmitted by end bearing held in concentric contact.

#### 2.4 DOWEL ADHESIVE

- A. Adhesive for reinforcing dowels in existing concrete shall conform to ASTM C881-13, Type IV, Grade 3, CLASS A, B, & C except gel times and epoxy content. Adhesive shall consist of a two component adhesive system contained in side by side packaging

connected to a mixing nozzle which thoroughly mixes the components as it is injected into the hole. Adhesive shall have passed ICC Evaluation Services, Inc. Acceptance Criteria 308 for long term creep and be specifically approved for use in cracked concrete.

### PART 3 EXECUTION

#### 3.1 FABRICATION

- A. Fabricate steel in accordance with ACI 318 and CRSI standards.
- B. Bend bars cold. Do not heat or flame cut bars. No field bending of bars partially embedded in concrete is permitted, unless specifically approved Design Professional and checked by Testing and Inspection Agency for cracks.
- C. Weld only as indicated. Perform welding in accordance with AWS D12.1 and or AWS D1.4.
- D. Tag reinforcing steel for easy identification.

#### 3.2 INSTALLATION

- A. Before placing concrete, clean reinforcement of foreign particles and coatings.
- B. Place, support, and secure reinforcement against displacement in accordance with ACI 318 and CRSI standards. Do not deviate from alignment or measurement.
- C. Place concrete beam reinforcement support parallel to main reinforcement.
- D. Locate welded wire fabric in the top third of slabs. Overlap mesh one lap plus two inches at side and end joints.
- E. Furnish and install dowels or mechanical splices at intersections of walls, columns and piers to permit continuous reinforcement or development lengths at such intersections.
- F. Maintain cover and tolerances in accordance with ACI and CRSI Specifications, unless indicated otherwise on Structural Drawings.

#### 3.3 SPLICES

- A. Do not splice reinforcement except as indicated on Structural Drawings.
- B. Tension couplers may be used and installed in accordance with manufacturer's specifications.

#### 3.4 DOWELS IN EXISTING CONCRETE

- A. Install dowels and dowel adhesive in accordance with manufacturer's recommendations.
- B. Minimum embedment length shall be 12 bar diameters, unless noted otherwise.

END OF SECTION

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**SECTION 033000 - CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section includes cast-in-place concrete work indicated in the Contract Documents or otherwise required for proper completion of the work.

1.2 RELATED SECTIONS

- A. Section 013300 - Structural Submittals.
- B. Section 014525 - Structural Testing/Inspection Agency Services.
- C. Section 031000 - Concrete Formwork.
- D. Section 032000 - Concrete Reinforcement.
- E. Section 036200 - Non-Shrink Grout.

1.3 REFERENCES

- A. ACI 214 - Recommended Practice for Evaluation of Strength Test Results of Concrete.
- B. ACI 301 - Specifications for Structural Concrete for Buildings.
- C. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
- D. ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete.
- E. ACI 305 - Hot Weather Concreting.
- F. ACI 306 - Cold Weather Concreting.
- G. ACI 308 - Standard Practice for Curing Concrete.
- H. ACI 309 - Guide for Consolidation of Concrete.
- I. ACI 318 - Building Code Requirements for Structural Concrete.
- J. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- K. ASTM C33 - Standard Specification for Concrete Aggregates.
- L. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- M. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
- N. ASTM C138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.

- O. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
- P. ASTM C150 - Standard Specification for Portland Cement.
- Q. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
- R. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- S. ASTM C230 - Standard Specification for Flow Table or Use in Tests of Hydraulic Cement.
- T. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- U. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
- V. ASTM C618 - Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- W. ASTM E1155 - Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System.
- X. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.4 NOTICE

- A. Notify Design Professional and Structural Testing/Inspection Agency not less than 48 hours prior to placing concrete.

1.5 QUALITY ASSURANCE

- A. Structural Testing/Inspection Agency shall perform the following quality related items:
  - 1. Examine concrete in truck to verify that concrete appears properly mixed.
  - 2. Perform a slump test as deemed necessary for each concrete load. Record if water or admixtures are added to the concrete at the job site. Perform additional slump tests after job site adjustments.
  - 3. Mold four specimens per set for compressive strength testing; one set for each 75 cubic yards of each mix design placed in any one day. For each set molded, record:
    - a. Slump
    - b. Air content
    - c. Unit weight
    - d. Temperature, ambient and concrete
    - e. Location of placement
    - f. Any pertinent information, such as addition of water, addition of admixtures, etc.

Perform one 7-day and two 28-day compressive strength tests. (Use one as a spare to be broken as directed by the Design Professional if compressive strengths do not appear adequate.)



4. Report in writing, as directed by the Design Professional, on the same day that tests are performed. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing agency, concrete design compressive strength, location of concrete placement in structure, concrete mix proportions and materials, compressive breaking strength and type of break.
  5. Test concrete slabs for specified flatness and levelness in accordance with ASTM E1155. As a minimum, test three placements: the first placement and two additional placements as directed by the Design Professional. If the tested placement does not meet the specified overall values, test the next placement.
- B. The ready-mixed concrete plant shall be certified for conformance with the requirements of the National Ready Mix Concrete Association.
  - C. The Structural Testing / Inspection Agency shall provide special inspections as required by Chapter 17 of the building code as required in Specification 01 4525.

#### 1.6 CONCRETE MIX DESIGN

- A. Establish concrete mix design proportions in accordance with ACI 318, Chapter 5.
- B. Submit concrete mix designs. Include the following:
  1. Type and quantities of materials.
  2. Slump.
  3. Air content.
  4. Fresh unit weight.
  5. Aggregates sieve analysis.
  6. Design compressive strength.
  7. Location of placement in structure.
  8. Method of placement.
  9. Method of curing.
  10. Seven-day and 28-day compressive strengths.
- C. Concrete supplier shall submit certifications that the materials used meet applicable ASTM Specifications. Mix designs not conforming to the above will be rejected.

#### 1.7 SLUMP

- A. Design concrete with a maximum slump of five inches.
- B. If a slump greater than five inches is desired it shall be achieved with a high-range water reducer. Design the concrete mix with a high range water reducer slump of two and one-half inches plus or minus one and one-half inches. The maximum slump after high-range water reducers are added shall be eight inches.

#### 1.8 FRESH UNIT WEIGHT

- A. Normal weight concrete shall have a fresh unit weight of 140 to 152 pcf.

#### 1.9 AIR CONTENT

- A. No entrained air content is required in concrete placed in the foundation.

- B. For normal weight concrete, entrained air content shall be four and one-half percent plus or minus one and one-half percent, unless specified otherwise.
- C. For normal weight concrete with required compressive strength equal to or greater than 5000 psi, entrained air content shall be three percent plus or minus one percent.
- D. For concrete elements within aggressive environments, entrained air content shall be 6 percent plus or minus one and one-half percent for normal weight concrete with required compressive strength equal to or less than 5000 psi.

1.10 WATER/CEMENT RATIO

- A. Concrete elements shall have a maximum water cement ratio of 0.50, unless noted otherwise.
- B. Air entrained concrete elements shall have a maximum water cement ratio of 0.45.
- C. Concrete elements within an aggressive environment shall have a maximum water/cement ratio of 0.45.

1.11 SUBMITTALS

- A. Submit a concrete mix design as specified above for each type of concrete included in the work.
- B. Submit a certification from each manufacturer or supplier stating that materials meet the requirements of the ASTM and ACI standards referenced.
- C. Submit manufacturer's data including Product Data and installation instructions for the following items. Manufacturer's Data shall include the name of the manufacturer and date of the publication. All manufacturers' data shall be maintained at the project site by the contractor.

- Admixtures
- Curing materials
- Joint sealing materials
- Expansion joint filler
- Patching compounds
- Bonding agents

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials designated by specific manufacturer's trade names are approved, subject to compliance with the quality and performance indicated by the manufacturer. Instructions and specifications, published by the manufacturer of such materials are included in and are a part of these specifications. Upon request, provide certification from manufacturer or supplier that materials designated by reference to ASTM and ACI standards meet the requirements of these standards.

2.2 CONCRETE STRENGTH

- A. Provide concrete strengths indicated on the Structural Drawings.

## 2.3 CEMENT

- A. Portland cement shall conform to ASTM C150, Type I, unless noted otherwise. Use one brand only.

## 2.4 AGGREGATE

- A. Fine aggregate shall conform to ASTM C33.
- B. Coarse aggregate of gravel or crushed stone shall conform to ASTM C33, Class 3M. Size coarse aggregate in accordance with ACI 318.

## 2.5 WATER

- A. Water shall be potable and free of deleterious substances in accordance with ACI 318.

## 2.6 AIR ENTRAINING AGENT

- A. Air entraining agent shall conform to ASTM C260.

## 2.7 WATER REDUCER

- A. Water reducing agent shall conform to ASTM C494.

## 2.8 HIGH-RANGE WATER REDUCER

- A. High-range water reducers (superplasticizers) shall conform to ASTM C494.

## 2.9 CHLORIDE

- A. Use no chlorides of any form in concrete.

## 2.10 CURING COMPOUND

- A. An acrylic curing compound meeting the requirements of ASTM C1315 and all local, state and federal Volatile Organic Carbon regulations may be used at the Contractor's option.

## 2.11 FLY ASH

- A. Fly ash shall be Class F fly ash with a loss on ignition of less than five percent or Class C fly ash with a loss on ignition of less than one percent in accordance with ASTM C618.

## 2.12 ACCELERATORS

- A. Non-chloride accelerators shall conform to ASTM C494.

## 2.13 RETARDERS

- A. Retarders shall conform to ASTM C494.

## PART 3 EXECUTION

3.1 HIGH-RANGE WATER REDUCERS

- A. High-range water reducers are to be added at dosage recommended by the manufacturer. The slump of the concrete shall be one to four inches at the time the high-range water reducers are added. Do not permit fresh concrete containing superplasticizers to come in contact with fresh concrete not containing superplasticizers.

3.2 ADDITION OF WATER AT JOB SITE

- A. Provide batch tickets indicating the amount of mix water withheld at the batch plant for each load of concrete delivered. Water may be added to the batch only if neither the maximum permissible water/cement ratio nor the maximum slump is exceeded.
- B. Water shall not be added to the batch after the required on-site testing has been performed.

3.3 PLACEMENT OF CONCRETE

- A. Deposit concrete as near as practical to final position to prevent segregation of concrete.
- B. Do no flowing of concrete with vibrators.
- C. Place floors and slabs in accordance with ACI 302.
- D. Do not use aluminum equipment in placing and finishing concrete.
- E. Place thickened slabs for partitions integral with floor slabs.
- F. Prepare place of deposit, mix, convey, place, and cure concrete in accordance with ACI 301, ACI 304, and ACI 318. Wet forms before placing concrete.

3.4 TIME LIMIT

- A. Deposit concrete within one and one-half hours after batching.

3.5 VIBRATION

- A. Consolidate concrete in accordance with ACI 301 and ACI 309.

3.6 CURING

- A. Begin curing procedures immediately following the commencement of the finishing operation.
- B. Cure concrete in accordance with ACI 308. Keep the concrete surface moist. If an acrylic curing compound is used, apply in accordance with manufacturer's recommendations to surfaces of concrete not protected for five days by formwork. Do not use curing compounds in areas to receive material that does not adhere to concrete cured with a curing compound unless the curing compound is water soluble.
- C. Moist cure concrete elements within aggressive environments as follows:
  - 1. Place burlap and polyethylene curing blankets on the surface and keep them continuously moist with sprinklers for seven days.

2. In hot weather or wind conditions, prevent rapid mix water evaporation and possible plastic shrinkage cracking by using evaporation retarders or fog sprays.
3. In cold weather, follow recommended procedures in ACI 306 and ACI 308.
4. After the curing blankets are removed, if a sealer is not specified to be applied, spray on a two-coat application of liquid membrane curing compound. If a sealer is to be applied a curing compound is not required.

### 3.7 ENVIRONMENTAL PROVISIONS

- A. Perform cold weather concreting in accordance with ACI 306.
- B. Perform hot weather concreting in accordance with ACI 305.
- C. Protect concrete from drying and excessive temperature for the first seven days.
- D. Protect fresh concrete from wind.

### 3.8 CONTRACTION JOINTS

- A. Obtain Design Professional 's approval for location of contraction joints.
- B. Do not place contraction joints in framed floors, composite slabs, or shear walls.
- C. Place contraction joints in slabs-on-grade as indicated on the Drawings.
- D. Provide contraction joints in concrete foundation or retaining walls at a maximum spacing of 20-foot but not more than 1.5 or less than 0.7 times the wall height. Space contraction joints equally between column interruptions in the wall surface such as pedestals, corners, or construction joints. Coordinate location with Architect. Contraction joints shall be formed as a **V**-groove on both faces of the wall, 3/4-inch minimum depth.
- F. For concrete elements within an aggressive environment, contraction joints must be sealed with a high quality traffic-grade joint sealant.
- G. For concrete elements within an aggressive environment, all metals running through the joint, including adjacent post-tensioning anchors, shall be epoxy- coated.

### 3.9 CUTTING CONCRETE

- A. Obtain Design Professional's written approval prior to cutting concrete for installation of other work.

### 3.10 PATCHWORK AND REPAIRS

- A. Notify Design Professional of any defective areas in concrete to be patched or repaired. Repair and patch defective areas with non-shrink grout. Cut out defective areas over two inches in diameter to solid concrete, but not less than a depth of one inch. Make edges of cuts perpendicular to the concrete surface.
- B. For concrete elements within an aggressive environment, cracks shall be repaired by routing and filling the crack with a polyurethane sealant suitable for vehicular traffic, unless specified or directed otherwise by the Design Professional.

### 3.11 CONCRETE FINISHES

- A. Finish concrete in accordance with ACI 301.
- B. Finish concrete slabs to flatness and levelness tolerances which correspond to  $F_F$  25/ $F_L$  20 minimum overall for composite of all measured values and  $F_F$  17/ $F_L$  12 minimum for any individual floor section.
- C. For concrete slabs to receive wood flooring, finish to flatness and levelness tolerances which correspond to  $F_F$  45/ $F_L$  30 minimum overall for composite of all measured values and  $F_F$  30/ $F_L$  20 minimum for any individual floor section.
- D. For shored construction,  $F_L$  values do not apply if slab is tested after shoring is removed.
- E. Slabs, which do not meet the flatness and levelness criteria shall be repaired or replaced.

END OF SECTION

**SECTION 033713 - SHOTCRETE****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Pneumatically applied concrete.

**1.2 RELATED REQUIREMENTS**

- A. Section 032000 - Concrete Reinforcing.
- B. Section 033000 - Cast-in-Place Concrete: Reinforcement.
- C. Section 331636 - Prestressed Concrete Storage Tanks.
- D. Section 099600 - High Performance Coatings.

**1.3 REFERENCE STANDARDS**

- A. ACI 506.2 - Specification for Shotcrete 2013.
- B. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- C. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2012.
- D. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- E. ASTM C150/C150M - Standard Specification for Portland Cement 2020.
- F. ASTM A821 - Standard Specification for Steel Wire, Hard-Drawn for Prestressed Concrete Tanks.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.

**1.5 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on admixtures.
- C. Shop Drawings: Indicate formwork, dimensions and thickness , reinforcement , accessories .
- D. Mix design test reports.

**1.6 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 506.2.
- B. Design work of this section under direct supervision of a Professional Engineer experienced in design of shotcrete structures and licensed in the State in which the Project is located.
- C. Applicator Qualifications: Company specializing in performing shotcrete installations, with minimum 3 years of documented experience.

**1.7 MOCK-UP**

- A. Test Panels: At the start of work, provide test panels for evaluation of materials and workmanship:
  - 1. Provide three test panels fabricated by placing shotcrete onto plywood for each mix design being considered.
  - 2. Form panels to identical shotcrete thickness with reinforcement in place.
- B. Coordinate location of mock-up panels with other trades and Engineer to be in an area of minimal disturbance.

## 1.8 FIELD CONDITIONS

- A. Ambient air temperature shall be a minimum of 50 degrees Fahrenheit prior to and during installation.
- B. Ensure that a minimum of 6 hours of cure time is present above freezing temperatures prior to the start of shotcrete application.
- C. Suspend shotcrete operations during high winds, rainy weather, or near freezing temperatures when work cannot be protected.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal; white color.
- B. Aggregate: Normal weight, ASTM C33/C33M, 3/8 inch (9 mm) maximum size.
- C. Reinforcing: As specified in Sections 331636, 033000, and as indicated herein.
- D. Pre-stressed reinforcement:
  - 1. Cold drawn, high carbon wire compliant with ASTM A821, as specified in Section 331636 - Prestressed Concrete Storage Tanks.
- E. Non - Prestressed Reinforcement:
  - 1. Reinforcing steel bars: Compliant with ASTM A615/A615M, Grade 60, as specified in Section 331636 - Prestressed Concrete Storage Tanks.
  - 2. Reinforcing mesh: Plain wire compliant with ASTM A1064/A1064M, with a minimum yield strength of 65,000 psi, and as specified in Section 331636 - Prestressed Concrete Storage Tanks.
- F. Galvanized Steel Diaphragm:
  - 1. Continuous mechanically bonded steel diaphragm shall be utilized as specified in Section 331636 - Prestressed Concrete Storage Tanks as a component of vertical reinforcement.
- G. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to shotcrete.
- H. Alignment Wire: Small gauge, high strength steel wire.

### 2.2 SHOTCRETE MIX

- A. Provide wet or dry mix design that gives good compaction and low percentage of rebound, is stiff enough not to sag.
- B. Comply with following requirements:
  - 1. Compressive Strength (28 day minimum): 4,000 psi (27.6 MPa).
  - 2. Slump (plus or minus 1 inch): 5 inch (127 mm).
  - 3. Maximum W/C Ratio: 0.42
  - 4. A maximum of 25% of cementitious material may be fly ash.
  - 5. Admixtures will not contain more than trace amounts of chlorides, fluorides, sulfides, or nitrates.
  - 6. Air Entrainment: Normal weight content before pumping of 6 to 9 percent.
  - 7. All shotcrete in contact with diaphragm or prestressing wire shall be proportioned to consist of not more than three parts sand to one part Portland cement by weight. All other shotcrete shall be proportioned to consist of not more than four parts sand to one part Portland cement by weight.
- C. Maintain quality control records during production of shotcrete; make records available.



## 2.3 EQUIPMENT

- A. Mixing Equipment: Capable of thoroughly mixing aggregate, cement, and water in sufficient quantity to maintain continuous placement.
- B. Delivery Equipment: Capable of discharging wet mix aggregate, cement, and water accurately, uniformly, and continuously.

## 2.4 SOURCE QUALITY CONTROL

- A. Engage and pay for services of an independent testing and inspection agency to perform testing and inspection services described below, in Section 3.5, and as specified in Section 014000. Payment for cost of these services will be made from the testing and inspection allowance specified in Section 012100.
- B. Prior to start of work, testing agency will review mix proportions, gradation, and quality of aggregate.
- C. Provide inspection for compliance with design mix.
- D. Test samples in accordance with ACI 506.2.
- E. Independent testing agency will test mock-up panels as follows:
  - 1. Drill 3 inch (75 mm) diameter core samples from test panels.
  - 2. Test for strength.
- F. Modify mix design as required based on results of testing.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that conditions are acceptable and are ready to receive work.
- C. Verify that field measurements are as indicated on drawings.
- D. Verify fabricated forms are:
  - 1. True to line and dimension.
  - 2. Adequately braced against vibration during placement.
  - 3. Constructed to permit escape of trapped air during gunning operations.
  - 4. Constructed to minimize rebound during gunning operations.
- E. Verify correct placement of reinforcement with sufficient clearances to permit complete encasement.
- F. Verify that embedded fittings, pipe, conduits, and other items are correctly and securely placed.
- G. Ensure easy access to shotcrete surfaces for screeding and finishing, and to permit uninterrupted application.

### 3.2 PREPARATION

- A. Determine operating procedures for placement in close quarters, extended distances, or around unusual obstructions where placement velocities and mix consistency may be adjusted during application.
- B. Clean and wet cementitious or absorptive substrate surfaces prior to receiving shotcrete. Keep porous surfaces damp for several hours prior to placement of shotcrete.
- C. Protect adjacent surfaces not receiving shotcrete.

### 3.3 ALIGNMENT CONTROL

- A. Provide alignment wire to establish thickness and plane of required surfaces.
- B. Install alignment wire at corners and offsets not established by forms.

- C. Tighten alignment wire true to line. Position adjustment devices to permit additional tightening.

### 3.4 APPLICATION

- A. Place reinforcement in accordance with ACI 506.2.
- B. Use mixing and delivery equipment capable of thoroughly mixing aggregate, cement, and water in sufficient quantity to maintain continuous and uniform placement.
- C. Do not place shotcrete on surfaces that are frozen, spongy, or where there is free water.
- D. Achieve maximum compaction with minimum rebound.
- E. Build-up to required thickness in multiple passes to achieve layering.
- F. Allow each layer to take initial set before applying succeeding layers.
- G. Do not permit applied shotcrete to sag, slough, or displace.
- H. After initial set of final layer, remove excess material outside of forms and alignment lines.
- I. Finish surface of final layer with steel trowel finish, or as indicated in Sections pertaining to work.
- J. Remove rebound at construction and expansion joints.
- K. Remove rebound material that does not fall clear of work; discard salvaged rebound.
- L. Maintain shotcrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of shotcrete.
- M. Immediately after placement and following initial set, protect shotcrete from premature drying, excessively hot or cold temperatures, and mechanical injury by water curing.
- N. Maintain surfaces wet for a minimum of 7 days.
- O. Sound test the applied material with hammer for voids. Expose voids and replace with new shotcrete ensuring full bond with adjacent work.

### 3.5 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Provide free access to shotcrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of shotcrete to inspection and testing firm for review prior to commencement of shotcrete operations.
- D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure five concrete test cylinders. Obtain test samples for every 50 cubic yards or less of each class of shotcrete placed.

### 3.6 PROTECTION

- A. Do not permit applied work to damage adjacent surfaces.

END OF SECTION

**SECTION 034100 - PRECAST CONCRETE UNITS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Section includes precast and precast prestressed structural concrete construction, including product design by a Professional Engineer licensed in the project state for information not shown on contract drawings, manufacture, transportation, erection, and other related items such as anchorage, bearing pads, storage and protection of precast concrete.

**1.2 RELATED SECTIONS**

- A. Section 01 45 25 - Structural Testing/Inspection Agency Services
- B. Section 03 62 00 - Non-Shrink Grout

**1.3 REFERENCES**

- A. ACI 301-Specifications for Structural Concrete Buildings.
- B. ACI 318-Building Code Requirements for Reinforced Concrete.
- C. MNL-116-Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products.
- D. ASTM C33-Standard Specification for Concrete Aggregates.

**1.4 QUALITY CONTROL**

- A. Coordinate and schedule in a timely manner with the Structural Testing / Inspection Agency inspection of fabrication and erection of the precast prestressed concrete units.
- B. The Structural Testing / Inspection Agency shall provide special inspections as required by Chapter 17 of the building code as required in Specification 01 4525.

**1.5 QUALIFICATION OF FABRICATOR**

- A. Fabricator shall have a minimum of five years of successful experience and 10 completed projects in fabrication of precast concrete units of quality and scope required on this project. Fabricator must be approved by the Design Professional. Fabricating plant shall engage primarily in the manufacturing of similar precast concrete units.
- B. Erector shall have a minimum of five years of successful experience and 10 completed projects in erection of precast concrete units of quality and scope required on this project. Fabricator must be approved by the Design Professional.

**1.6 SUBMITTALS**

- A. Submit shop drawings showing prestressing strands, steel reinforcement, location of openings, built-in work, design camber and miscellaneous details to the Design

Professional for review prior to fabrication. Do not use contract drawings for shop drawings.

- B. Submit precast member and system design calculations and shop drawings sealed by a Professional Engineer licensed in the project state.
- C. Submit concrete test reports to the Design Professional. Concrete test reports shall be complete and show all information required by the PCI "Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products".
- D. Submit concrete mix designs including aggregate analysis and confirmation cylinders to the Design Professional.
- E. Submit concrete records, tensioning records, calibration records for jacking equipment, and reinforcing inspection records to the Design Professional.

## PART 2 PRODUCTS

### 2.1 PRECAST UNITS

- A. Furnish precast or precast prestressed units in accordance with Precast/Prestressed Concrete Institute "Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products".
- B. Design units according to ACI 318 for load and span conditions indicated on the contract documents.

### 2.2 MANUFACTURING TOLERANCES

- A. Provide units with tolerances within the limits recommended by the Prestressed Concrete Institute "Manual for Quality Control for Plant and Production of Precast Prestressed Concrete Products" for architectural wall panels.
- B. Cast units on individual flat beds with smooth rigid forms.

### 2.3 GROUT

- A. Comply with the requirements of Section 03 62 00.

### 2.4 ACCESSORIES

- A. Provide all clips, hangers, and other accessories required for installation of precast units and for support of subsequent construction or finishes.
- B. Provide accessories to adjust panel elevations at precast joints to ensure alignment of adjacent panels.

### 2.5 DESIGN MODIFICATIONS

- A. Design modifications may be made only as acceptable to the Design Professional. Maintain the general design concept shown without increasing or decreasing sizes of

members or altering profiles and alignment shown. Provide complete design calculations and drawings prepared by a Professional Engineer licensed in the project state.

### PART 3 EXECUTION

#### 3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver precast concrete units to the project site in such quantities and at such times as will assure the continuity of the installation. Store units at the project site to ensure against cracking, distortion, staining, or other physical damage. Lift and support units at the same points where they will be supported in the finished structure.

#### 3.2 PREPARATION

- A. Installer must examine all parts of the supporting structure and the conditions under which the precast concrete work is to be erected. Notify the Contractor in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Verify dimensions of supporting structures at the project site and adjust final shop drawings to reflect actual field dimensions.
- C. Provide bearing areas sufficient to prevent excessive bearing stresses. Provide bearing length of four inches minimum unless otherwise approved.
- D. Do not erect units until supporting members are completely in place. Locate units on supporting construction to provide a minimum end bearing unless otherwise shown on the drawings.

#### 3.3 INSTALLATION

- A. Install precast concrete framing structural members plumb, level, and in alignment within the specified limits of erection tolerances. Provide temporary supports and bracing as required to maintain position, stability and alignment as members are being permanently connected.
- B. Install flexible bearing pads where indicated as precast units are being erected. Set pads on level, uniform bearing surfaces and maintain in correct position until precast units are placed.
- C. Do not install precast units until concrete has attained its design ultimate compressive strength.
- D. Install precast units without exceeding the following tolerance limits:
  - 1. Variations from plumb: 1/4"
  - 2. Variations from Level or Elevation: 1/4"
  - 3. Variation from Theoretical Position in Plan: Plus or minus 1/4" maximum at any location.
  - 4. Offsets in Alignment of Adjacent Members at Any joint: 1/16"

- E. Grout open spaces at connections and joints, after precast concrete units have been placed and permanently connected.
- F. Provide forms or other method for retaining grout in place until hard enough to support itself. Pack spaces with grout by tamping or ramming until voids are completely filled.
- G. Perform cutting and fitting of precast slab units as required for the passage of other projecting or adjacent work. Provide straight and clean cuts without breaking or spalling edges.
- H. Do not cut any reinforcing steel members unless otherwise acceptable to the precast unit manufacturer and the Design Professional.
- I. Reinforce edges of cut openings where required to maintain the structural integrity of the precast units.
- J. Lifting devices shall be removed after units are in place.

END OF SECTION

**SECTION 036200 - NON-SHRINK GROUT**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section includes non-shrink grout under base plates, bearing plates, and where specified in Contract Documents.

1.2 RELATED SECTIONS

- A. Section 013330 - Structural Submittals.
- B. Section 014525 - Structural Testing/Inspection Agency Services.

1.3 REFERENCES

- A. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- B. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens).

1.4 QUALITY ASSURANCE

- A. Structural Testing/Inspection Agency shall perform the following quality related items:
  - 1. Perform compressive strength tests in accordance with ASTM C109 with 2-inch x 2-inch cubes. Test one cube at three days, two cubes at seven days and three cubes at 28 days. Perform one test for each ten bags of grout used or one test in accordance with day of grouting.

1.5 SUBMITTALS

- A. Submit product data sheets for review.

PART 2 PRODUCTS

2.1 GROUT

- A. Provide a non-shrink, non-metallic grout that complies with ASTM C1107.
- B. Grout shall have a minimum compressive strength of 5000 psi at 28 days.

2.2 WATER

- A. Provide clean, potable water.

PART 3 EXECUTION

3.1 HANDLING

- A. Store and protect non-shrink grout from moisture and contamination.

3.2 PREPARATION

- A. Remove mud, dirt and other foreign materials from areas to be grouted.

3.3 MIXING

- A. Mix grout to its fluid, self-leveling consistency in accordance with manufacturers recommendations. Do not retemper grout. Do not exceed manufacturer's maximum limit on water content or use at a consistency which produces free bleeding. Mix grout in a paddle-type mortar mixer. Do not mix by hand.

3.4 PLACEMENT

- A. Consolidate grout to provide uniformity. Do not vibrate grout.
- B. Use forms to contain grout.

3.5 PROTECTION

- A. Protect grout and areas to be grouted from excessive heat and cold in accordance with manufacturer's specifications. Protect grout from excessive drying shrinkage resulting from wind or direct sunlight. Protect areas grouted from excessive vibrations for three days.

END OF SECTION



## SECTION 042000 - UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Concrete masonry units.
  - 2. Masonry Veneer brick in Cavity Wall – see also section 042613 Masonry Veneer

#### 1.2 RELATED SECTIONS

- A. Section 042200 Structural Concrete Masonry.
- B. Section 071406 Cold Fluid Applied Waterproofing
- C. Section 042613 Masonry Veneer

#### 1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
- C. Samples for Verification: For each type and color of each exposed clay masonry units and colored mortar.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include data on material properties material test reports substantiating compliance with requirements.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
3. Test reports for fire rated units.

## 1.6 QUALITY ASSURANCE

- A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
  1. Build sample panels for typical exterior wall in sizes as shown in Masonry Veneer Spec Section. Include structural masonry back up wall with clay veneer masonry to show complete cavity wall section with insulation, flashings, vents, weeps and mortar net.

## 1.7 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## PART 2 - PRODUCTS

### 2.1 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work on the building. Minor defective units may be used on the amenity structures as approved by the owner. Minor defects are defined as cosmetic not structural.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
  1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

## 2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Refer to Structural Unit Masonry Spec section for requirements of this sub section.
- B. Concrete Building Brick: ASTM C55.
  - 1. Refer to Structural Unit Masonry Spec section for requirements regarding the use of and type of concrete building brick.

## 2.3 CONCRETE LINTELS

- A. Concrete Lintels: Refer to structural drawings for requirements and use of concrete lintels if any.

## 2.4 BRICK

- A. General: Refer to Spec Section 042613 Masonry Veneer

## 2.5 MORTAR AND GROUT MATERIALS

- 1. Refer to spec sections 042613 Masonry Veneer and section 042200 Structural Unit masonry for requirements.

## 2.6 REINFORCEMENT

- A. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
- B. Masonry-Joint Reinforcement for Multiwythe Masonry:
  - A. See also Section 042613 Masonry Veneer and section 042200 Structural Concrete Masonry for requirements.
    - 1. Ladder type with one side rod at each face shell of hollow masonry units more than 4 inches (100 mm) wide, plus two side rods at each wythe of masonry 4 inches (100 mm) wide or less.

## 2.7 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.

- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
  2. See also specification sections 042200 Structural Unit Masonry and 042613 Masonry Veneer.
  3. Seismic Masonry-Veneer Anchors: Connector section and rib-stiffened, sheet metal anchor section with screw holes top and bottom, and having slotted holes for inserting connector section. Connector section consists of a rib-stiffened, sheet metal bent plate, sheet metal clip, or wire tie with rigid PVC extrusion designed to engage continuous wire.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) Hohmann & Barnard, Inc.
      - 2) Wire-Bond.

## 2.8 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch (0.40 mm) thick.
  2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
  3. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/8 inch (13 mm) out from wall, with outer edge bent down 30 degrees.
  4. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
  5. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
- B. Flexible Flashing: Use the following unless otherwise indicated:
1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy. Utilize in locations where metal flashings are not feasible or possible.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- 1) Hohmann & Barnard, Inc.
- 2) Mortar Net Solutions.
- 3) Wire-Bond.

- C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

## 2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from urethane.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).
- D. Weep/Cavity Vent Products: Use the following unless otherwise indicated:
1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, 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. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) CavClear/Archovations, Inc.
      - 2) Hohmann & Barnard, Inc.
      - 3) Mortar Net Solutions.
- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Hohmann & Barnard, Inc.
    - b. Mortar Net Solutions.
    - c. Wire-Bond.
  2. Configuration: Provide one of the following:

- a. Strips, full depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.

## 2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
    - b. EaCo Chem, Inc.
    - c. PROSOCO, Inc.

## 2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
  - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
  - 1. See also specification sections: 042200 Structural Unit Masonry and 042613 Masonry Veneer.
- B. Mortar for Unit Masonry: Comply with ASTM C270, provide the following types of mortar for applications stated 1500 psi compressive strength as noted in the Structural Concrete Unit Masonry specification section 042200 and as noted on structural drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting

of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

### 3.2 TOLERANCES

#### A. Dimensions and Locations of Elements:

- 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
- 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
- 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

#### B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
- 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
- 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

#### C. Joints:

- 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
- 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
- 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).
- 4. Variations in joints must be consistent in appearance and be properly aligned with adjacent courses vertically and horizontally.

### 3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: See drawings
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid masonry units and hollow brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

### 3.5 COMPOSITE MASONRY

- A. Bond wythes of composite masonry together using one of the following methods as follows:
  - 1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
    - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
    - b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.



- B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
- C. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with mortar at exterior walls, except cavity walls.
- D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
- E. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

Retain one of three subparagraphs below and revise to suit Project. If more than one type of bonding is required, revise subparagraphs and show locations of each on Drawings.

- 1. Provide individual metal ties not more than 16 inches (406 mm) o.c.
- 2. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
- 3. Provide rigid metal anchors not more than 24 inches (610 mm) o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

### 3.6 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods as follows:
  - 1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. (0.25 sq. m) of wall area spaced not to exceed 24 inches (610 mm) o.c. horizontally and 16 inches (406 mm) o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (915 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches (610 mm) o.c. vertically.
  - 2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
    - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
    - b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.
    - c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches (300 mm) o.c. both ways, on inside face of insulation boards, or attach with

plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

### 3.7 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:
1. Fasten seismic anchors to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
  2. Embed tie sections in masonry joints.
  3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and horizontally. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 24 inches (610 mm), around perimeter.

### 3.8 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
1. Space reinforcement not more than 16 inches (406 mm) o.c.
  2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
  3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

### 3.9 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
1. Provide an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  2. Anchor masonry with anchors embedded in masonry joints and attached to structure.

3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

### 3.10 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as per Masonry Veneer Spec Section 042613

### 3.11 REINFORCED UNIT MASONRY

Usually retain "Temporary Formwork and Shores" Paragraph below only if reinforced masonry beams, slabs, soffits, and similarly formed elements are required.

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
  1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  2. Limit height of vertical grout pours to not more than 60 inches (1520 mm) unless approved otherwise by the Structural Engineer.

### 3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Engage a qualified testing agency to perform tests and inspections noted below as Owners responsibility to be paid under the inspections and testing allowance of Section 012100, Allowances.
- B. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- C. Inspections: Special inspections according to Level C in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
  2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
  3. Place grout only after inspectors have verified proportions of site-prepared grout.
- D. Testing Prior to Construction: One set of tests.
- E. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- F. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C67 for compressive strength.
- G. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.
- H. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- I. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for mortar air content and compressive strength.
- J. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

### 3.13 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch (19 mm). Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3 mm per 300 mm). Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

### 3.14 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
  3. Protect adjacent surfaces from contact with cleaner.

4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

### 3.15 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
  1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

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**SECTION 042200 - STRUCTURAL CONCRETE MASONRY**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section includes structural concrete masonry shown on the Structural Drawings.

1.2 RELATED SECTIONS

- A. Section 013330 - Structural Submittals.
- B. Section 014525 - Structural Testing/Inspection Agency Services.
- C. Section 032000 - Concrete Reinforcement.
- D. Section 033000 - Cast-in-Place Concrete.
- E. Section 042613 – Masonry Veneer.
- F. Section 047200 – Cast Stone Section.

1.3 REFERENCES

- A. ACI 530.1/ASCE 6/TMS 602 - Specifications for Masonry Structures.
- B. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
- C. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- D. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
- E. ASTM C90 - Standard Specification for Load-Bearing Concrete Units.
- F. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens).
- G. ASTM C140 - Standard Methods of Sampling and Testing Concrete Masonry Units.
- H. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
- J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
- K. ASTM C476 - Standard Specification for Grout for Masonry.
- L. ASTM C1019 - Standard Method of Sampling and Testing Grout.
- M. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.

- N. ASTM E447 - Standard Test Methods for Compressive Strength of Masonry Prisms.

1.4 SUBMITTALS

- A. Submit coarse grout mix design.
- B. Upon request, submit material certificates signed by the material supplier that the masonry units, mortar, reinforcement, and joint material complies with specification requirements.
- C. Submit shop drawings for masonry reinforcement in accordance with Section 03200.
- D. Submit procedures for construction of masonry walls to be filled with coarse grout. Procedures should include high lift or low lift grouting as applicable to project.

1.5 QUALITY ASSURANCE

- A. Structural Testing/Inspection Agency shall perform the following quality related items:
  - 1. Verify reinforcing steel for quantity, size, and location.
  - 2. Verify placement of coarse grout as indicated in high or low lift procedure.
  - 3. Verify compressive strength of concrete masonry units, mortar, coarse grout, or masonry prisms for each 5,000 sq. ft. of surface area as follows:
    - a. Three (3) concrete masonry units shall be tested in accordance with ASTM C140.
    - b. Six (6) mortar cube specimens shall be tested, three (3) at 7-days and three (3) at 28-days, in accordance with ASTM C109.
    - c. Four (4) coarse grout specimens shall be tested, two (2) at 7-days and two (2) at 28-days, in accordance with ASTM C1019.
    - d. In lieu of individual tests of masonry units, mortar, and grout, if directed by the Design Professional, perform one (1) prism test (which consists of three prisms) in accordance with ASTM E447.
- B. The Structural Testing / Inspection Agency shall provide special inspections as required by Chapter 17 of the building code as required by Specification 01 4525.

1.6 HANDLING OF MATERIALS

- A. Package, handle, and store materials to protect from elements and prevent contamination.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY

- A. Concrete masonry shall have the minimum compressive strength (f'm) specified on the Drawings.

2.2 CONCRETE MASONRY UNITS

- A. Concrete masonry units shall conform to ASTM C90, Type II (moisture controlled).
- B. Provide normal weight concrete masonry units.



- C. Concrete masonry units shall have, as a minimum, the net area compressive strength listed in Table 1.6.2.2 of ACI 530.1/ASCE 6/TMS 602 required for the specified  $f'_m$ .
- D. Provide standard units with face dimensions of 16" long x 8" high nominal, unless indicated otherwise.
- E. Provide special shapes where indicated on the Drawings.

### 2.3 MORTAR

- A. Mortar shall be Type M or Type S in accordance with ASTM C270. Refer to Drawings for locations.
- B. Do not use admixtures that contain chlorides.

### 2.4 COARSE GROUT

- A. Coarse grout shall conform to ASTM C476.
- B. Coarse grout shall have the minimum compressive strength specified on the Drawings.
- C. Mix grout to a consistency which has a slump between 8 and 10 inches.
- D. Do not use admixtures that contain chlorides.

### 2.5 WATER

- A. Provide clean potable water free of deleterious substances.

### 2.6 REINFORCEMENT

- A. Horizontal and vertical reinforcing bars shall comply with Section 03200.

### 2.7 HORIZONTAL JOINT REINFORCEMENT

- A. Horizontal joint reinforcement shall be manufactured with longitudinal parallel, deformed side wires in accordance with ASTM A496 and of the size specified on the Drawings. Cross wires shall be No. 9 gage, plain, in accordance with ASTM A82.
- B. Provide as a minimum, one side wire for each face shell of hollow masonry units. Provide additional side wires or eye sections for adjustable wall ties as specified for multiwythe wall construction.
- C. Provide truss type joint reinforcement, except ladder type reinforcement shall be used for walls with vertical reinforcement.
- D. Horizontal joint reinforcement shall be hot-dipped galvanized in accordance with ASTM A153, Class B-2.
- E. Provide prefabricated corner and tee shape corner accessories.

### 2.8 CONTRACTION JOINT MATERIAL

- A. Contraction joint material shall comply with ASTM D2000, M2AA-805 with rubber shear keys with a minimum durometer hardness of 80.

### PART 3 EXECUTION

#### 3.1 MIXING

- A. Except as otherwise approved for small batches, mix in mechanically operated batch mixers of drum type in which water can be accurately and uniformly controlled. Allow five minutes maximum mixing time, two minutes for dry mixing and three minutes for continued mixing after water has been added. Do not permit volume of batch to exceed manufacturer's rated capacity of mixer drum. Empty drum completely before placing next batch. Keep mixers and wheelbarrows clean. Do not deposit mortar upon or permit contact with ground.
- B. Do not use anti-freeze compounds.

#### 3.2 CONSTRUCTION

- A. Use dry masonry units. No frozen or wet units shall be used.
- B. Discard cracked, chipped, and spalled masonry units.
- C. Deliver mortar to mason's board at point of use within 45 minutes after mixing. Do not retempering. Use no admixtures. Use pre-hydrated mortar for tuck points. Prepare pointing mortar with as dry consistency as will produce mortar sufficiently plastic to be worked into joints.
- D. During erection cover top of wall with strong waterproof membrane at end of each day when shutdown. Cover partially completed walls when work is not in progress. Extend and secure cover a minimum of 24 in. down both sides. Do not apply uniform floor or roof loading for at least 12 hours after building masonry columns or walls. Do not apply concentrated loads for at least 3 days after building masonry columns or walls.
- E. Provide temporary bracing during erection as required to stabilize erected masonry.
- F. Except where otherwise indicated, lay block in running bond.

#### 3.3 PLACING AND BONDING

- A. Lay masonry in full beds of mortar on mating surfaces, and properly jointed with other work. Buttering corners of joints, deep or excess furrowing of mortar joints is not permitted.
- B. Fully bond external corners of concrete block. Where interior block partitions intersect other block walls or partitions, provide control joints with mortar raked back 1/4 inch.
- C. Isolate masonry partitions from vertical structural framing members with control joints, with mortar raked back 1/4 inch.
- D. Where non-bearing masonry partitions extend to underside of floor, roof deck or structural system, stop masonry short 3/8 to 1/2 inch to allow for live load deflection. Fill gap with soft joint filler.

- E. Where masonry chase walls are constructed, one wall can be stopped above ceiling to provide access space.

### 3.4 CONTRACTION JOINTS

- A. Install contraction joints at locations indicated on the Drawings in all masonry walls. Do not run masonry reinforcement through contraction joints.

### 3.5 TOLERANCES

- A. Variation from Unit to Adjacent Unit: 1/32 inch maximum.
- B. Variation from Plan of Wall: Maximum 1/4 inch in 10 feet, and 1/2 inch in 20 feet or more.
- C. Variation from Plumb: +/- 1/4 inch in 10 feet, +/- 3/8 inch in 20 feet; +/- 1/2 inch maximum.
- D. Variation in Level Coursing: +/- 1/4 inch in 10 feet; +/- 1/2 inch maximum.
- E. Variation in Joint Thickness: +/- 1/8 inch Maximum.

### 3.6 CLEANING AND POINTING

- A. Clean space as it is completed, but in every case, clean at least once each week. All debris shall be removed to appropriate container and hauled off the site as required to avoid over filling.
- B. Dry brush masonry surfaces before mortar has set hard to remove mortar crumbs and accumulation.
- C. Clean masonry with commercial brick cleaner approved by brick manufacturer. Protect other work from cleaning materials.
- D. Cut out defective mortar and repoint.

### 3.7 HORIZONTAL JOINT REINFORCEMENT

- A. Place horizontal joint reinforcement in the horizontal mortar beds at spacings as noted in the Drawings, except as specified herein.
- B. For masonry below grade, space horizontal joint reinforcing at 8 inches vertically.
- C. Above lintels and below sills at openings, place a continuous run of horizontal joint reinforcement in the first two bed joints, 8 inches apart. Extend joint reinforcement two feet beyond opening.
- D. Joint reinforcement shall be continuous, except it shall not pass through vertical masonry contraction joints. Lap joint reinforcement a minimum of 6 inches.

### 3.8 ENVIRONMENTAL PROVISIONS

- A. Cold weather masonry construction shall comply with the International Masonry All-Weather Councils' "Recommended Practices and Guide Specifications for Cold Weather Masonry Construction, Section 04200."

END OF SECTION

## SECTION 042613 - MASONRY VENEER

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Clay face brick.

B. Products Installed but Not Furnished under This Section:

1. Steel lintels in masonry veneer.
2. Steel shelf angles for supporting masonry veneer.

C. RELATED SECTIONS:

1. Unit Masonry 042000
2. Structural Unit Masonry 042200
3. 071416 Cold Fluid Applied Waterproofing

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type and color of brick and colored mortar.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product.

#### 1.4 QUALITY ASSURANCE

A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for typical exterior wall in sizes approximately 60 inches (1500 mm) long by 60" high by full thickness.

#### 1.5 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## PART 2 - PRODUCTS

### 2.1 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects will be exposed in the completed Work.

### 2.2 BRICK

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
  1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
  2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Clay Face Brick: Facing brick complying with ASTM C216.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Belden Brick Company (The).
    - b. Boral Bricks, Inc; Boral Limited.
    - c. Cherokee Brick.
  2. Basis of Design Product: Field Brick-Cherokee Providence (Red) and Accent Brick-Cherokee Velour Oatmeal. See drawings for locations.
  3. Grade SW.
  4. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C67.
  5. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
  6. Size (Actual Dimensions): 3-1/2 inches (89 mm) wide by 2-1/4 inches (57 mm) high by 7-1/2 inches (190 mm) long.

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C91/C91M.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Cemex S.A.B. de C.V.
    - b. Lafarge North America Inc.
    - c. Lehigh Hanson; HeidelbergCement Group.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Davis Colors.
    - b. Euclid Chemical Company (The); an RPM company.
    - c. Solomon Colors, Inc.
- F. Colored Cement Products: Packaged blend made from portland cement and hydrated lime masonry cement or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
  - 1. Colored Portland Cement-Lime Mix:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Holcim (US) Inc.
      - 2) Lafarge North America Inc.
      - 3) Lehigh Hanson; HeidelbergCement Group.
  - 2. Colored Masonry Cement:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Holcim (US) Inc.
      - 2) Lafarge North America Inc.
      - 3) Lehigh Hanson; Heidelberg Cement Group.

- G. Aggregate for Mortar: ASTM C144.
1. White-Mortar Aggregates: Natural white sand or crushed white stone.
  2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

## 2.4 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
  2. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.35-mm-) diameter, hot-dip galvanized-steel wire.
  2. Tie Section: Triangular-shaped wire tie made from 0.25-inch- (6.35-mm-) diameter, hot-dip galvanized-steel wire.
- D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.105-inch- (2.66-mm-) thick, steel sheet, galvanized after fabrication.
  2. Tie Section: Triangular-shaped wire tie made from 0.25-inch- (6.35-mm-) diameter, hot-dip galvanized-steel wire.
  3. Corrugated-Metal Ties: Metal strips not less than 7/8 inch (22 mm) wide with corrugations having a wavelength of 0.3 to 0.5 inch (7.6 to 12.7 mm) and an amplitude of 0.06 to 0.10 inch (1.5 to 2.5 mm) made from 0.075-inch- (1.90-mm-) thick steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete.
  4. Seismic Masonry-Veneer Anchors: Connector section and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with projecting tabs having slotted holes for inserting vertical leg of connector section. Connector section consists of a rib-stiffened, sheet metal bent plate with down-turned leg designed to fit in anchor section slot and with integral tabs designed to engage continuous wire.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) Hohmann & Barnard, Inc.
      - 2) Wire-Bond.



2.5 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch (0.40 mm) thick.
2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
4. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 7-oz./sq. ft. (2-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
  - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - 1) Advanced Building Products Inc.
    - 2) Hohmann & Barnard, Inc.
    - 3) Wire-Bond.
2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).
  - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - 1) Carlisle Coatings & Waterproofing Inc.
    - 2) Hohmann & Barnard, Inc.
    - 3) W.R. Meadows, Inc.
3. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
  - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - 1) Hohmann & Barnard, Inc.
    - 2) Mortar Net Solutions.
    - 3) Wire-Bond.

- C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from urethane or PVC.
- B. Weep/Vent Products: Use one of the following unless otherwise indicated:
  - 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. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) Hohmann & Barnard, Inc.
      - 2) Mortar Net Solutions.
      - 3) Wire-Bond.
  - 2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, 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. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) CavClear/Archovations, Inc.
      - 2) Hohmann & Barnard, Inc.
      - 3) Mortar Net Solutions.
  - 3. Vinyl Weep Hole/Vent: Units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) Hohmann & Barnard, Inc.
      - 2) Williams Products, Inc.
      - 3) Wire-Bond.
- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Hohmann & Barnard, Inc.
  - b. Mortar Net Solutions.
  - c. Wire-Bond.
2. Configuration: Provide one of the following:
  - a. Strips, full depth of cavity and 10 inches (250 mm) high, with dovetail-shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.
  - b. Sheets or strips, full depth of cavity and installed to full height of cavity.

## 2.7 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
    - b. EaCo Chem, Inc.
    - c. PROSOCO, Inc.

## 2.8 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  1. Do not use calcium chloride in mortar or grout.
  2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Use Type N unless another type is indicated.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
  1. Pigments shall not exceed 10 percent of portland cement by weight.
  2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
  3. Application: Use pigmented mortar for exposed mortar joints.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Architect's sample.
2. Application: Use colored aggregate mortar for exposed mortar joints.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

#### 3.2 TOLERANCES

##### A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

##### B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

##### C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

### 3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: As shown on the drawings.
- C. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

### 3.5 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:
  - 1. Fasten seismic anchors to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
  - 2. Embed connector sections and continuous wire in masonry joints.
  - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  - 4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and horizontally. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 24 inches (610 mm), around perimeter.
- B. Provide not less than 1.5 inches of airspace between back of masonry veneer and face of insulation.

### 3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete to comply with the following:
  - 1. Provide an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
  - 3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

### 3.7 FLASHING, WEEP HOLES, AND VENTS

Retain option in "General" Paragraph below if wall is designed on rain-screen principle with vents acting to equalize air-pressure differential between cavity and exterior. Indicate spacing of vents and blocking on Drawings. See the Evaluations.

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
  - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
  - 2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
  - 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
  - 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
- C. Install weep holes in veneers in head joints of first course of masonry immediately above embedded flashing.
  - 1. Use specified weep/vent products to form weep holes.
  - 2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
- D. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.
  - 1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

### 3.8 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Engage a qualified testing agency to perform tests and inspections noted below as Owners responsibility to be paid under the inspections and testing allowance of Section 012100, Allowances.
- B. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- C. Inspections: Special inspections according to Level C -See Unit Masonry Spec Section.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- D. Testing Prior to Construction: One set of tests.
- E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C67 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

### 3.9 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
  2. Protect adjacent stone and non-masonry surfaces from contact with cleaner.
  3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

### 3.10 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042613

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## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cast-stone trim.
  - 2. Cast-stone curbing.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For cast-stone units, include dimensions and finishes.
- B. Shop Drawings: Show fabrication and installation details for cast-stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
- C. Samples:
  - 1. For each color and texture of cast stone required.
  - 2. For colored mortar same as for brick.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C1364.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer of cast-stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute or the Precast/Prestressed Concrete Institute for Group A, Category AT.

## PART 2 - PRODUCTS

### 2.1 CAST-STONE UNITS

- A. Cast-Stone Units: Comply with ASTM C1364.
  - 1. Units shall be manufactured using the vibrant dry tamp method.
- B. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

C. Cure Units as Follows:

1. Cure units in enclosed, moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F (38 deg C) for 12 hours or 70 deg F (21 deg C) for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:
  - a. No fewer than five days at mean daily temperature of 70 deg F (21 deg C) or above.
  - b. No fewer than six days at mean daily temperature of 60 deg F (16 deg C) or above.

D. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

E. Colors and Textures: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666.
- B. Dowels: 1/2-inch- (12-mm-) diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666.
- C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cast-stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
    - b. EaCo Chem, Inc.
    - c. PROSOCO, Inc.

2.3 MORTAR

- A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.
  1. For setting mortar, use Type N.
  2. For pointing mortar, use Type N.
- B. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

## PART 3 - EXECUTION

## 3.1 SETTING CAST STONE IN MORTAR

- A. Set units in full bed of mortar with full head joints unless otherwise indicated.
  - 1. Fill dowel holes and anchor slots with mortar.
  - 2. Fill collar joints solid as units are set.
  - 3. Build concealed flashing into mortar joints as units are set.
  - 4. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
  - 5. Keep joints at shelf angles open to receive sealant.
- B. Rake out joints for pointing with mortar to depths of not less than 3/4 inch (19 mm). Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- C. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
- D. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.
- E. Rake out joints for pointing with sealant to depths of not less than 3/4 inch (19 mm). Scrub faces of units to remove excess mortar as joints are raked.
- F. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated.
  - 1. Keep joints free of mortar and other rigid materials.
  - 2. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

## 3.2 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
  - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
  - 2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.
- B. Fill anchor holes with sealant.
  - 1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
- C. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

- D. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

### 3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch (1.5 mm), except where variation is due to warpage of units within tolerances specified.

### 3.4 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
  - 1. Remove mortar fins and smears before tooling joints.
  - 2. Remove excess sealant immediately, including spills, smears, and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
  - 3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
  - 5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

END OF SECTION 047200

## **SECTION 05 1300 - STRUCTURAL STAINLESS STEEL**

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Section includes fabrication and erection of structural stainless steel indicated in the Contract Documents or otherwise required for proper material completion of the work.

#### 1.2 RELATED SECTIONS

- A. Section 01 3330 - Structural Submittals.
- B. Section 01 4525 - Structural Testing/Inspection Agency Services.

#### 1.3 REFERENCES

- A. AISC - Code of Standard Practice for Steel Buildings and Bridges.
- B. AISC - Steel Design Guide 27: Structural Stainless Steel with 2015 Revisions.
- C. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Screws, and Studs.
- D. ASTM A276 - Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
- E. ASTM A789 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- F. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- G. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
- H. ASTM A240 - Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip.

#### 1.4 SUBMITTALS

- A. Contact Design Professional prior to detailing structural steel shop drawings.
- B. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.
- C. Submit shop drawings for review.
- D. Shop drawings shall clearly indicate the profiles, sizes, ASTM Grade, spacings and locations of all structural steel members, including connections, attachments, anchorages, framed openings, sizes and types of fasteners, method of tightening fasteners, cambers, and the number, type and spacing of the headed shear connectors.
- E. For connections and elements designed by the contractor, submit shop drawings and calculations sealed by an engineer licensed in the project state.

- F. For record only, submit written welding procedures for each type of welded joint used in accordance with Appendix E of the AWS Structural Welding Code.
- G. Maintain at construction office mill certification that the steel supplied meets the specifications.
- H. Maintain at construction office certification that high strength bolts supplied meet the specifications.
- I. Submit certification that the fabricator meets the required qualifications. If fabricator has to have an independent testing agency to inspect fabrication as required by these specifications, submit the name and qualifications of the independent testing agency.
- J. For each approved fabricator that is exempt from Special Inspections of shop fabrications and implementation procedures in accordance with Section 1704.2 of the Building Code, submit "Fabricator's Certificate of Compliance". Provide copies of fabricator's certification or building code evaluation services report and fabricator's quality control manual.
- K. Submit certification that the erector meets the required qualifications.
- L. Upon request, submit the erection sequence and procedures to be used by the steel erector.
- M. Manufacturer's recommendations for expansion anchor installation.
- N. Manufacturer's recommendations for adhesive anchor installation.

1.5 QUALITY ASSURANCE

A. Structural Testing/Inspection Agency shall perform the following quality related items:

1. Anchor Bolts

- a. Anchor bolt size, configuration, and embedment shall be verified prior to placement of concrete.

2. Welded Connections

- a. Inspection shall be in accordance with AWS Structural Welding Code.
- b. Visually inspect all field welded connections. Visual inspection of welded joints includes periodic examination of fit up.
- c. Ultrasonically inspect 100% of the complete penetration welds.
- d. Review approved welding procedures. Verify that welding procedures are being adhered to during field welding.
- e. Verify welder qualifications.

3. Bolted Connections

- a. Inspection and testing shall be in accordance with AISC Specifications for Structural Joints using High-Strength Bolts.
- b. Prior to visual and physical testing, tension testing using a calibration device (Skidmore-Wilhelm) must indicate tensions at least 5% in excess of the AISC minimum. Structural steel erector shall supply the tension calibration device.
- c. Test a minimum of 10% of the bolted connections.

B. The Structural Testing / Inspection Agency shall provide special inspections as required by Chapter 17 of the building code as required by Specification 01 4525.

## 1.6 FABRICATOR'S QUALIFICATIONS

- A. Steel fabricator shall be certified by the American Institute of Steel Construction (AISC) Quality Certification Program for Buildings (BU).
- B. Fabricator not certified by the AISC Quality Certification Program shall have fabrication procedures and fabricated steel tested and inspected by an independent testing agency. Payment of these tests and inspections shall be by the fabricator. Tests and inspections shall be performed by AWS Certified Welding Inspectors. Prior to delivery of structural steel to the project, submit copies of the inspection reports to the Design Professional. The purpose of this inspection is to enable the testing/inspection agency to verify that, in general, the steel is being fabricated in accordance with the Contract Documents. A minimum of one trip per week is recommended. The first trip should be scheduled in the early stages of fabrication. Contact Design Professional prior to initial inspection. Tests and inspections shall include the following:
  - 1. Examine mill test reports and verify that material being used is the same as the mill test reports.
  - 2. Review the fabricator's written welding procedures. Verify that the fabricator's welding procedures are being followed. Verify that welders are certified with current papers and that they demonstrate proper techniques.
  - 3. Observe high strength bolting procedures. Verify that shop installation of high strength bolts conforms to AISC specifications.
  - 4. Examine joint preparation for complete penetration joints. Ultrasonically inspect 100% of the complete penetration welds.
  - 5. Examine fillet welds for proper size, profile, throat, porosity and end returns.
  - 6. Examine steel members for lamellar tearing. Spot check dimensions and hole sizes.
  - 7. Examine bolted areas for burrs.

## 1.7 ERECTOR'S QUALIFICATION

- A. Erector shall be experienced in erecting structural systems similar in complexity to this project as evidenced by 10 completed projects.
- B. Erector shall have a minimum of 5 years experience in the erection of structural steel or is an AISC Certified Advanced Steel Erector.

## 1.8 STORAGE

- A. Store materials off ground to permit easy access for inspection and identification. Store steel members and packaged items in a manner that provides protection against contact with deleterious materials.

## PART 2 PRODUCTS

### 2.1 ANCHOR ROD

- A. Anchor rods shall conform to ASTM F593 and shall be a headed rod or threaded rod with a heavy hexagonal nut welded to the bottom of the threaded rod.
- B. Provide two hexagonal nuts and two plain steel washers for each anchor rod conforming to ASTM A240.
- C. Provide 3/8-inch thick plate washers (4-inch x 4-inch) in lieu of top steel washer on base plates with oversized holes.

## 2.2 SHAPED STRUCTURAL STEEL TUBING

- A. Shaped structural steel tubing shall conform to ASTM A789, Grade C, 30 ksi minimum yield strength.

## 2.3 HIGH-STRENGTH FASTENERS

- A. High-strength bolts shall conform to ASTM A240 as noted on the Structural Drawings.
- B. Provide 3/4-inch minimum diameter bolts, unless noted otherwise.
- C. Hardened steel washers shall conform to ASTM A240.
- D. Spline-type tension control bolts, plain hardened washers and suitable nuts are an acceptable alternate design bolt assembly.
- E. Do not use load indicating washers.

## 2.4 HEADED STUDS

- A. Headed stainless steel studs shall conform to the requirements of AWS D1.6.
- B. Provide 3/4-inch diameter headed stainless steel studs, unless noted otherwise.
- C. Provide heat-resistant ceramic arc shields with studs.

## 2.5 EXPANSION ANCHORS

- A. Expansion anchors shall have been evaluated by the ICC Evaluation Services, Inc. (ICC-ES) with a published evaluation report. Anchors shall be evaluated by ICC-ES Acceptance Criteria 193 and be specifically approved for use in cracked concrete. All anchors shall be approved for resisting wind and seismic loads.

## 2.6 ADHESIVE ANCHORS

- A. Adhesive anchors shall consist of:
  1. An all-thread stainless steel anchor conforming to ASTM A193, Grade A, unless noted otherwise on the Structural Drawings, and
  2. An adhesive conforming to ASTM C881-02, Type IV, Grade 3, CLASS A, B, & C except gel times and epoxy content. Adhesive shall consist of a two component adhesive system contained in side by side packaging connected to a mixing nozzle which thoroughly mixes the components as it is injected into the hole. Adhesive shall have passed ICC Evaluation Services, Inc. Acceptance Criteria 308 for long term creep and be specifically approved for use in cracked concrete.

## 2.7 WELD ELECTRODES

- A. E-70 series low hydrogen electrodes shall conform to AWS A5.1, A5.5, A5.17, or A5.20.
- B. Properly store electrodes to maintain flux quality.

## 2.8 **DELETED**

## PART 3 EXECUTION



### 3.1 GENERAL

- A. Fabricate and erect structural steel in accordance with AISC Specifications and Code of Standard Practice.
- B. Notify Design Professional and Structural Testing/Inspection Agency at least 48 hours prior to structural steel fabrication and erection.

### 3.2 ANCHOR BOLT SETTING

- A. Provide templates for setting anchor bolts. Position anchor bolts by using templates with two nuts to secure in place prior to placement of concrete.
- B. Do not erect steel where anchor bolt nuts will not have full threads.

### 3.3 CONNECTIONS

- A. Provide a minimum of two fasteners at each bolted connection.
- B. Ensure fasteners are lubricated prior to installation.
- C. Provide high-strength bolted connections in accordance with AISC Specifications for Structural Joints using High Strength Bolts.
- D. Provide connections for expansion and contraction where steel beams connect to concrete walls or concrete columns and at expansion joints. Secure nuts on bolts against loosening. (Dent threads with a chisel.)

### 3.4 FASTENER INSTALLATION

- A. Bolts shall be installed in holes of the connection and brought to snug tight condition. Tighten connection progressing systematically from the most rigid part to the free edges of the connection to minimize relaxation of the bolts.
- B. High-strength bolts installed shall have a hardened washer under the element turned in tightening.
- C. Installation and tightening of bolts shall conform to the AISC Specifications for Structural Joints.

### 3.5 HEADED STUDS

- A. Headed studs shall be welded in accordance with AWS D1.6.
- B. Locate shear studs directly over the web of beams with flanges less than 0.3 inches thick.
- C. The minimum center spacing shall be 6 diameters along the longitudinal axis of the beam and 4 diameters transverse to the longitudinal axis of the beam.
- D. Where double rows of shear studs are required, begin double rows at each end of the beam.
- E. Remove shields after welding studs.

### 3.6 EXPANSION ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation.

- B. Minimum embedment shall be equal to 4.5 times the anchor diameter unless noted otherwise.

### 3.7 ADHESIVE ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation.
- B. Minimum embedment shall be equal to 4.5 times the anchor diameter unless noted otherwise.

### 3.8 WELDING

- A. Comply with AWS Structural Welding Code. Use prequalified weld procedures.
- B. Provide end returns where fillet welds terminate at end or sides. Returns shall be continuous for a distance of not less than two times the nominal size of the weld.
- C. Complete penetration joints shall be back gouged to sound metal before the second side is welded or have 1/4-inch root opening with 3/16 x 1 inch backing bar. Access holes are required. Filling access holes is not required.
- D. Remove all slag and weld splatter from deposited weld metal.

### 3.9 SPLICING

- A. Splice members only where indicated unless authorized in writing by the Design Professional.
- B. Provide shim plates at bottom flange splice at continuous beam splices with different depths.

### 3.10 CUTTING

- A. Do not use flame cutting to correct errors unless authorized in writing.
- B. Re-entrant corners shall have a minimum radius of one inch and be free of notches. Notches and gouges resulting from flame cutting shall be finished to a smooth appearance.

### 3.11 MILL SCALE

- A. Remove loose mill scale.

### 3.12 BOLT HOLES

- A. Cut, drill, or punch holes perpendicular to metal surfaces. Do not enlarge holes by burning. Drill or punch holes in bearing plates. Remove burrs.

### 3.13 **DELETED**

END OF SECTION

## SECTION 055000 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 RELATED SECTIONS:

- A. 057100 – Pre-fabricated Interior Metal Stairs

#### 1.2 SUMMARY

##### A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Prefabricated metal canopies and support columns and rods. (see also structural dwgs)
3. Shelf angles.
4. Roof Hatch Metal ladder.
5. Miscellaneous steel trim.
6. Metal bollards.
7. Downspout guards.
8. Abrasive metal nosing's and treads.
9. Loose bearing and leveling plates.

##### B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete.

#### 1.3 ACTION SUBMITTALS

##### A. Product Data: For the following:

1. Fasteners.
2. Shop primers.
3. Prefabricated canopies, struts, rods and columns.
4. Slotted channel framing.
5. Manufactured metal ladders.
6. Metal bollards.
7. Downspout guards.
8. Abrasive metal nosings and treads.

##### B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Show connections, flashings, drainage and tie in details to adjacent materials and elements.

- C. Samples: For each type and finish of extruded nosing and tread.
- D. Delegated-Design Submittal: For ladders and pre-fabricated canopies and supports, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders and pre-fabricated canopies, columns and supports.
- B. Structural Performance of Steel Ladders: Ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Pre-Fabricated Steel or Aluminum Building Canopies, columns, rods and other support elements. For design and structural performance comply with criteria on architectural and structural drawings. Comply with applicable building codes and local ordinances.

### 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- D. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- E. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- F. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.
  - 1. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- G. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.
- H. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.
- I. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

## 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless steel fasteners for fastening all items in this section.
- B. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated. Provide bolts, washers, and shims as needed, all stainless steel.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
  - 1. Material for Interior and Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

## 2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- H. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- I. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

## 2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. 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.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. 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 exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

## 2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- B. Fabricate steel pipe columns for supporting canopy frame construction from steel pipe with steel baseplates and top plates. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

## 2.7 PREFABRICATED BUILDING COLUMNS

- A. General: Provide prefabricated canopy columns consisting of load-bearing structural-steel members protected by brick veneer. Fabricate connections to comply with details shown or as needed to suit type of structure indicated. Brick veneer anchors to attach to column.

## 2.8 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated on the structural drawings and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
  - 1. Provide mitered and welded units at corners.
  - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize and prime shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with zinc-rich primer.
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete unless shown otherwise on the structural drawings and specifications.

## 2.9 ROOF HATCH METAL LADDER

- A. General:
  - 1. Comply with ANSI A14.3.
- B. Steel Ladders:
  - 1. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm) steel flat bars, with eased edges.
  - 2. Rungs: 3/4-inch- (19-mm-) diameter, steel bars.
  - 3. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
  - 4. Provide nonslip surfaces on top of each rung.
  - 5. Prime ladders, including brackets and fasteners, with zinc-rich primer.

## 2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
  - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime exterior miscellaneous steel trim with zinc-rich primer.

#### 2.11 METAL BOLLARDS

- A. Fabricate 8" metal bollards from Schedule 80 steel pipe. Fill with concrete and round top. Paint concrete exposed and bollard.
- B. Fabricate bollards with 3/8-inch- (9.5-mm-) thick, steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch (19-mm) anchor bolts.
- C. Fabricate sleeves for bollard anchorage from steel or stainless steel pipe or tubing with 1/4-inch- (6.4-mm-) thick, steel or stainless steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of bollard.
- D. Prime steel bollards with zinc-rich primer.

#### 2.12 DOWNSPOUT GUARDS

- A. Fabricate downspout guards from 3/8-inch- (9.5-mm-) thick by 12-inch- (300-mm-) wide, steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch (50-mm) clearance between downspout and pipe guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.
- B. Galvanize and prime steel downspout guards.
- C. Prime steel downspout guards with zinc-rich primer.

#### 2.13 ABRASIVE METAL NOSINGS and TREADS

- A. Cast-Metal Units: Cast aluminum, with an integral-abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. American Safety Tread Co., Inc.
    - b. Safe-T-Metal Company, Inc.
    - c. Wooster Products Inc.



- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Apply bituminous paint to concealed surfaces of cast-metal units.

#### 2.14 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize bearing and leveling plates.
- C. Prime plates with zinc-rich primer.

#### 2.15 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Galvanize and prime loose steel lintels located in exterior walls.
- C. Prime loose steel lintels located in exterior walls with zinc-rich primer.

#### 2.16 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

#### 2.17 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.

#### 2.18 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
  - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with primers specified in Section 099113 "Exterior Painting" unless zinc-rich primer is indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
  5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- 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 no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

### 3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.
- C. Anchor shelf angles securely to existing construction with expansion anchors, anchor bolts or through bolts unless shown otherwise on structural drawings and specifications
- D. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

### 3.3 INSTALLATION OF PREFABRICATED BUILDING COLUMNS

- A. Install prefabricated building columns to comply with ANSI/AISC 360, "Specifications for Structural Steel Buildings," and with requirements applicable to listing and labeling for fire-resistance rating indicated.

### 3.4 INSTALLATION OF METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
- B. Anchor bollards to existing construction with anchor bolts. Provide four 3/4-inch (19-mm) bolts at each bollard unless otherwise indicated.
  - 1. Embed anchor bolts at least 4 inches (100 mm) in concrete.
- C. Anchor bollards in concrete in formed or core-drilled holes not less than 42 inches (1050 mm) deep and 3/4 inch (19 mm) larger than OD of bollard. Fill annular space around bollard solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.
- D. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- E. Fill bollards solidly with concrete, mounding top surface to shed water.

### 3.5 INSTALLATION OF BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.6 REPAIRS

- A. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

**SECTION 055133 - METAL LADDERS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Shop-fabricated metal ladders.
- B. Prefabricated ladders.
- C. Ladder safety systems.

**1.2 RELATED REQUIREMENTS**

- A. Section 055100 - Metal Stairs.
- B. Section 055213 - Pipe and Tube Railings.
- C. Section 099113 - Exterior Painting: Paint finish.
- D. Section 099123 - Interior Painting: Paint finish.

**1.3 REFERENCE STANDARDS**

- A. 29 CFR 1910.28 - Duty to have Fall Protection and Falling Object Protection Current Edition.
- B. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices Current Edition.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).
- D. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements 2018.
- E. ANSI/ASSP Z359.16 - Safety Requirements for Climbing Ladder Fall Arrest Systems 2016.
- F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
- G. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire 2019.
- H. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 1999 (Ed. 2004).
- I. SSPC-SP 2 - Hand Tool Cleaning 2018.

**1.4 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.
- C. Shop Drawings:
  - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- D. Certificate: Provide documentation that ladder safety system products of this section meet or exceed cited 29 CFR 1910.28, 29 CFR 1910.29, ANSI/ASSP Z359.16, and ANSI A14.3 requirements.
- E. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

**PART 2 PRODUCTS****2.1 MATERIALS - STEEL**

- A. Steel Sections: ASTM A36/A36M.

- B. Mechanical Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

## 2.2 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B211/B211M, 6063 alloy, T6 temper.
- B. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.
- C. Bolts, Nuts, and Washers: Stainless steel.

## 2.3 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

## 2.4 FABRICATED LADDERS

- A. Ladders: Steel or Aluminum; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
  - 1. Side Rails: 3/8 by 2 inches (9 by 50 mm) members spaced at 20 inches (500 mm).
  - 2. Rungs: One inch (25 mm) diameter solid round bar spaced 12 inches (300 mm) on center.
  - 3. Space rungs 7 inches (175 mm) from wall surface.

## 2.5 PREFABRICATED LADDERS

- A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
  - 1. Components: Manufacturer's standard rails, rungs, treads, handrails, returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
  - 2. Materials: Carbon steel; ASTM A1011/A1011M Grade 36, minimum or Aluminum; ASTM B211/B211M6063 alloy, T52 temper.
  - 3. Finish for Aluminum Ladders: Mill finish aluminum.
  - 4. Finish for Carbon Steel Ladders: Powder coat; color to be selected by Engineer from manufacturer's standard range.
  - 5. Manufacturers:
    - a. Design Components, Inc.; [www.designcomponents.com](http://www.designcomponents.com)
    - b. Industrial Ladder & Scaffolding, Inc.; [www.anyladder.com](http://www.anyladder.com)
    - c. Precision Ladders, LLC; [www.precisionladders.com](http://www.precisionladders.com)
    - d. Substitutions: See Section 016000 - Product Requirements.

## 2.6 LADDER SAFETY SYSTEMS

- A. Ladder Cage Systems
  - 1. Safety cages shall be in accordance with OSHA Standards 1926.1053 and 1910.23.
  - 2. Furnish Ladder Cage systems as indicated in Construction Drawings.

3. Cages shall be equipped with a flared bottom opening.
4. Ladder cages to be 7' from the bottom of the ladder system, or otherwise indicated within Construction Drawings.
5. Material:
  - a. Constructed of like material to ladder and accessories.

## 2.7 FINISHES - STEEL

- A. Prepare surfaces to be primed in accordance with SSPC-SP2.
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Prime Painting: One coat.

## 2.8 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: Class I natural anodized.
- B. Interior Aluminum Surfaces: Class I natural anodized.
- C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Confirm that the ladder structure to which the ladder safety system is installed is capable of withstanding the loads applied by the system in the event of a fall.

### 3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

### 3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Install ladder safety system in accordance with manufacturer's instructions.
- C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION

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## SECTION 055213 - PIPE AND TUBE RAILINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Steel pipe and tube railings.
2. Aluminum pipe and tube railings.
3. Stainless-steel pipe and tube railings. See section 057100 Pre-fabricated Stairs.

#### 1.2 ACTION SUBMITTALS

##### A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

##### B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

##### C. Samples: For each type of exposed finish required.

#### 1.3 INFORMATIONAL SUBMITTALS

##### A. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935.

#### 1.4 MANUFACTURERS

##### A. Steel Pipe and Tube Railings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. R & B Wagner, Inc.
  - b. Trex Commercial Products, Inc.
  - c. VIVA Railings, LLC.

##### B. Aluminum Pipe and Tube Railings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Blum, Julius & Co., Inc.
  - b. R & B Wagner, Inc.
  - c. Superior Aluminum Products, Inc.

C. Stainless-Steel Pipe and Tube Railings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Blum, Julius & Co., Inc.
  - b. R & B Wagner, Inc.
  - c. Stainless Fabricators, Inc.

1.5 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in to design railings, including attachment to building construction.
- B. Basis of Design: As shown on the drawings.
- C. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
    - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  2. Infill of Guards:
    - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
    - b. Infill load and other loads need not be assumed to act concurrently.

1.6 METALS, GENERAL

- A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
  1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.

## 1.7 STEEL

- A. Tubing: ASTM A500 (cold formed) or ASTM A513.
- B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- C. Plates, Shapes, and Bars: ASTM A36/A36M.

## 1.8 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Bars and Tubing: ASTM B221 (ASTM B221M), Alloy 6063-T5/T52.
- C. Drawn Seamless Tubing: ASTM B210 (ASTM B210M), Alloy 6063-T832.
- D. Plate and Sheet: ASTM B209 (ASTM B209M), Alloy 6061-T6.
- E. Die and Hand Forgings: ASTM B247 (ASTM B247M), Alloy 6061-T6.
- F. Castings: ASTM B26/B26M, Alloy A356.0-T6.

## 1.9 STAINLESS STEEL

- A. Tubing: ASTM A554, Grade MT 304.
- B. Castings: ASTM A743/A743M, Grade CF 8 or CF 20.

## 1.10 FASTENERS

- A. General: Provide the following:
  - 1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5 for zinc coating.
  - 2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329 for zinc coating.
  - 3. Aluminum Railings: Type 304 stainless-steel fasteners.
  - 4. Stainless-Steel Railings: Type 304 stainless-steel fasteners.
  - 5. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.

6. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

#### 1.11 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- E. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- F. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- G. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
- H. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- I. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- J. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

#### 1.12 FABRICATION

- A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- B. Form work true to line and level with accurate angles and surfaces.
- C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  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 flux immediately.

4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- D. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- E. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- F. Form changes in direction by bending or by inserting prefabricated elbow fittings.
- G. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- H. Close exposed ends of railing members with prefabricated end fittings.
- I. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
- J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

#### 1.13 STEEL AND IRON FINISHES

- A. Galvanized Railings:
  1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
  2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
  3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
- B. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
- D. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
  1. Color: Match Architect's sample.

### 1.14 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Color and Gloss: Match Architect's sample.

### 1.15 STAINLESS-STEEL FINISHES

- A. Stainless Steel Tubing Finishes:
  - 1. 180-Grit Polished Finish: Uniform, directionally textured finish.
- B. Stainless Steel Sheet and Plate Finishes:
  - 1. Directional Satin Finish: ASTM A489/A480, No. 4.

## PART 2 - EXECUTION

### 2.1 INSTALLATION, GENERAL

- A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
  - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

### 2.2 ANCHORING POSTS

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.

### 2.3 ATTACHING RAILINGS

- A. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- B. Secure wall brackets and railing end flanges to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.

### 2.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055213

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**SECTION 055313 - BAR GRATINGS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes metal bar gratings.

1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Clips and anchorage devices for gratings.
  - 2. Paint products.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work.
- C. Delegated-Design Submittal: For gratings, including manufacturers' published load tables and/or analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Alabama Metal Industries, All American Grating, McNichols

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design FRP gratings.
- B. Structural Performance: Gratings shall withstand the effects of gravity loads and the loads and stresses within limits and under conditions as indicated in Contract Documents.
  - 1. Limit deflection to L/360 or 1/4 inch, whichever is less.
- C. Seismic Performance: Gratings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. Component Importance Factor: 1.5.

2.3 METAL BAR GRATINGS

- A. Metal Bar Grating Standards: Comply with NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual".

- B. Pressure-Locked, Stainless-Steel Grating: Fabricated by swaging crossbars between bearing bars.
  - 1. Bearing Bar Spacing: As noted in Contract Documents
  - 2. Bearing Bar Depth: As noted in Contract Documents
  - 3. Bearing Bar Thickness: As noted in Contract Documents
  - 4. Crossbar Spacing: 4 inches o.c.
  - 5. Traffic Surface: Plain.
  - 6. Finish: Mill finish.

## 2.4 FERROUS METALS

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A240/A240M, Type 304.
- B. Stainless-Steel Bars and Shapes: ASTM A276, Type 304.

## 2.5 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless-steel fasteners for fastening stainless steel.
- B. Post-Installed Anchors: Torque-controlled expansion or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

## 2.6 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

## 2.7 FABRICATION

- A. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- B. Fit exposed connections accurately together to form hairline joints.

2.8 GRATING FRAMES AND SUPPORTS

- A. Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.
  - 1. Unless otherwise indicated, fabricate from same basic metal as gratings.
  - 2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- B. Fit exposed connections accurately together to form hairline joints.
  - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Attach toe plates to gratings by welding at locations indicated.

3.2 INSTALLING METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 ADJUSTING AND CLEANING

- A. Touchup 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-PA 1 requirements for touching up shop-painted surfaces.

END OF SECTION 055313

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## SECTION 057100 – PREFAB INTERIOR METAL STAIRS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes pre-fabricated interior metal stairs.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For metal stairs and the following:
  - 1. Stainless Steel Handrails and Guardrails and platforms.
  - 2. Stainless steel anchors into concrete and masonry substrates
  - 3. Grout.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
  - 3. Include plan at each level.
- C. Delegated-Design Submittal: For stairs, handrails and guardrails including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that the engineer is licensed in the State in which Project is located.
- B. Welding certificates.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
  - 2. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs, and railings, including attachment to building construction.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
  - 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
  - 3. Uniform and concentrated loads need not be assumed to act concurrently.
  - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
  - 5. Limit deflection of treads, platforms, and framing members to L/360 or 3/16" or whichever is less.
- C. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. Component Importance Factor: See Structural Drawings for seismic classifications at project location.

### 2.2 METALS

- A. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- B. Aluminum Sheet: Flat sheet complying with ASTM B209 (ASTM B209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties of not less than Alloy 5005-H32.
- C. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.
- D. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

### 2.3 FASTENERS

- A. General: Provide Type 304 stainless steel fasteners
  - 1. Select fasteners for type, grade, and class required.
- B. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593, and nuts, ASTM F594 (ASTM F836M).

## 2.4 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
  1. Join components by welding unless otherwise indicated.
  2. Use connections that maintain structural value of joined pieces.
- B. Assemble stairs in shop to greatest extent possible.
  1. Disassemble units only as necessary for shipping and handling limitations.
  2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
  1. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated.
  2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections 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. Weld exposed corners and seams continuously unless otherwise indicated.
  5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 - No evidence of a welded joint.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
  1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
  2. Locate joints where least conspicuous.

## 2.5 FABRICATION OF STAIRS

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Architectural Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of aluminum channels.
  - a. Stringer Size: As required to comply with "Performance Requirements" Article.
  - b. Provide closures for exposed ends of channel stringers.
  - c. Finish: manufacturers standard corrosive and acid resistant finish.
2. Construct platforms of aluminum plate or channel rectangular tube headers and miscellaneous framing members as required to comply with "Performance Requirements" Article and as indicated on the Drawings.
  - a. Provide closures for exposed ends of channel and tube framing.
  - b. Finish: manufacturers standard corrosive and acid resistant finish.
3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

C. Subtreads, Risers, and Subplatforms:

1. Form subtreads, risers, and subplatforms to configurations indicated from aluminum and shapes of thickness determined by manufacturer's stair designer.
2. Weld subtreads to stringers.
  - a. Locate welds on top of subtreads where they will be concealed by finished treads.
3. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads.
  - a. Weld subplatforms to platform framing.
  - b. Locate welds on top of subplatforms where they will be concealed by finished flooring.
  - c. Smooth Soffit Construction: Construct sub platforms with flat metal under surfaces to produce smooth soffits.

2.6 STAIR RAILINGS

- A. Comply with applicable requirements on drawings and local code requirements.
  1. Connect posts to stair framing by direct welding unless otherwise indicated.

2.7 FINISHES

- A. Finish metal stairs after assembly.
- B. Stainless Steel Finishes:



1. Stainless -Steel Tubing Finishes:
  - a. 180-Grit Polished Finish: Uniform, directionally textured finish.
2. Stainless Steel Sheet and Plate Finishes:
  - a. Directional Satin Finish: ASTM A480/A480M, No. 4.

## PART 3 - EXECUTION

### 3.1 INSTALLING METAL STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
  1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
  1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.
    - a. Clean bottom surface of plates.
    - b. Set plates for structural members on wedges, shims, or setting nuts.
    - c. Tighten anchor bolts after supported members have been positioned and plumbed.
    - d. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
    - e. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.
      - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
      - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints.
  1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
  2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
  3. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

3.2 REPAIRS

- A. Adjacent surfaces ie. Concrete floors and walls and cmu walls. Repair to new condition if damaged.
- B. Touchup Painting: Cleaning and touchup painting of adjacent surfaces if repairs needed.
- C. Aluminum Surfaces: Clean field welds, bolted connections, and abraded areas, and replace any damage aluminum members.

END OF SECTION 057100

## SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking and nailers.
4. Wood furring and grounds.
5. Wood sleepers.
6. Utility shelving.
7. Plywood backing panels.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.

### PART 2 - PRODUCTS

#### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Dress lumber, S4S, unless otherwise indicated.

- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

## 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, 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 and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  - 4. Wood floor plates that are installed over concrete slabs-on-grade.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
  - 1. Interior and Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
  - 2. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

D. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Concealed blocking.
3. Roof framing and blocking.
4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
5. Plywood backing panels.
6. Wood shims, blocking etc. found in fire rated walls.

## 2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any species.
- B. Other Framing: Construction or No. 2 grade of the following species:
  1. Southern pine; SPIB.

## 2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  1. Blocking.
  2. Nailers.
  3. Rooftop equipment bases and support curbs.
  4. Cants.
  5. Furring.
  6. Grounds.
  7. Utility shelving.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Utility Shelving: Lumber with 15 percent maximum moisture content of eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. Concealed Boards: 15 percent maximum moisture content of any of the following species and grades:
  1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
  2. Eastern softwoods, No. 2 Common grade; NELMA.

## 2.6 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

## 2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or Type 304 stainless steel.
- B. Screws for Fastening to Metal Framing: ASTM C1002, length as recommended by screw manufacturer for material being fastened.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

## 2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs or concrete block wall; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- F. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

### 3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

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## SECTION 061600 - SHEATHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Wall sheathing.
  - 2. Roof sheathing.
  - 3. Parapet sheathing.
  - 4. Underlayment.
  - 5. Sheathing joint and penetration treatment.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
  - 1. Wood-preserved-treated plywood.
  - 2. Fire-retardant-treated plywood.

#### 1.4 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood unless otherwise indicated.

#### 1.5 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
  - 1. Interior and Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings.

1.6 WALL SHEATHING

- A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.

1.7 ROOF SHEATHING

- A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.

1.8 PARAPET SHEATHING

- A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.

1.9 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For roof parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or Type 304 stainless steel.

PART 2 - EXECUTION

2.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
  - 2. ICC-ES evaluation report for fastener.
- D. Coordinate wall parapet and roof] sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

END OF SECTION 061600

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## SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
1. Include plans, elevations, sections, and attachment details.
  2. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples: For each exposed product and for each color and texture specified.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Research reports.
- C. Field quality control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
  - 1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Licensed participant in AWI's Quality Certification Program.

1.7 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. Provide certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
- B. Architectural Woodwork Standards Grade: Custom.
- C. Type of Construction: Frameless.
- D. Door and Drawer-Front Style: Flush overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Formica Corporation.
    - b. Lamin-Art, Inc.
    - c. Wilsonart LLC.
- F. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGS.
  - 2. Postformed Surfaces: Grade HGP.
  - 3. Vertical Surfaces: Grade HGS.
  - 4. Edges: Grade HGS.
  - 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

- I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  1. Match Architect's sample.

## 1.8 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  1. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  1. Particleboard: ANSI A208.1, Grade M-2.
  2. Softwood Plywood: DOC PS 1, medium-density overlay.

## 1.9 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening.
- C. Wire Pulls: Back mounted, solid metal, 5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.
- D. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- E. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04102; with shelf brackets, B04112.
- F. Drawer Slides: ANSI/BHMA A156.9.
  1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
    - a. Type: Full extension.
    - b. Material: Epoxy-coated steel with polymer rollers.
  2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.

3. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
4. For drawers more than 3 inches (75 mm) high, but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
5. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-100.

G. Door Locks: ANSI/BHMA A156.11, E07121.

H. Drawer Locks: ANSI/BHMA A156.11, E07041.

I. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.

1. Satin Stainless Steel: ANSI/BHMA 630.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

#### 1.10 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: 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 metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: Urea formaldehyde.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

#### 1.11 FABRICATION

A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.



## PART 2 - EXECUTION

### 2.1 INSTALLATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.
- B. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.
  - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Install cabinets without distortion so doors and drawers fit openings 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.
  - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 12 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish and expansion anchors into masonry walls.

### 2.2 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
  - 1. Inspection entity shall prepare and submit report of inspection.

END OF SECTION 064116

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**SECTION 067301 - FIBERGLASS REINFORCED PLASTIC (FRP) GRATING**

## 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 fiberglass reinforced plastic (FRP) grating and accessories.
- B. Related Requirements:
  - 1. 033000 - Cast-in-Place Concrete for concrete anchors and connections.

## 1.3 REFERENCES

- A. AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
  - 1. ASCE 7 Minimum Design Loads for Buildings and Other Structures
- B. ASTM INTERNATIONAL (ASTM)
  - 1. ASTM D2344/D2344M Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
  - 2. ASTM D638 Standard Test Method for Tensile Properties of Plastics
  - 3. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
  - 4. ASTM D953 Standard Test Method for Pin-Bearing Strength of Plastics
  - 5. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
  - 6. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
  - 7. ASTM G154 Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
  - 8. ASTM G155 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

## 1.4 SUBMITTALS

- A. Product Data: For each type of product and manufacturer's published literature including the following:
  - 1. Structural design data
  - 2. Structural properties data
  - 3. Resin data
  - 4. Grating load/deflection tables
  - 5. Corrosion resistance tables
  - 6. Certificates of compliance
  - 7. Test reports, as applicable
  - 8. Concrete anchor systems and their allowable load tables
  - 9. Design calculations for systems not sized or designed in the contract documents.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include details of equipment assemblies. Indicate dimensions, types, loads, required clearances, method of field assembly, components, and location and size of each field

connection.

- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Certification of Anchorage System compliance with ASCE 7.
- F. Maintenance data.

#### 1.5 DELIVERY, HANDLING, AND STORAGE

- A. Follow manufacturer's recommendations for shipping, handling, and erection procedures and care and maintenance instructions.
- B. Deliver manufactured materials in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Ensure that all adhesives, resins, and their catalysts and hardeners are crated or boxed separately, and noted as such.
- C. Handle all materials to prevent abrasion, cracking, chipping, twisting, other deformations, and other types of damage.
- D. Store adhesives, resins and their catalysts in dry indoor facilities between 70 and 85 degrees F until they are required.

#### 1.6 QUALITY ASSURANCE

- A. Provide items by manufacturers having a minimum of 10 years of experience in the design and manufacture of similar products and systems. In addition, if requested, provide a record of at least five separate, similar, successful installations in the last five years.
- B. Manufacturer shall be certified to the ISO 9001 standard.

#### 1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace all FRP products that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 3 year(s) from date of Substantial Completion.

### PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

- A. Provide gratings composed of continuous roving fiberglass reinforcement and resin in qualities, quantities, properties, arrangements, and dimensions as necessary to meet the design requirements and dimensions as specified.
- B. Provide resin of polyester with chemical formulations as necessary to provide the corrosion resistance, strength, and other physical properties conforming to the specified requirements.
- C. Completely cover all glass fibers with resin to protect against their exposure to ultraviolet light, wear, or weathering.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Gratings
  - 1. Provide gratings capable of withstanding the effects of gravity loads in accordance with ASCE 7, ICC (IBC) , and the following loads and stresses within the limits and under the conditions indicated:
    - a. Walkways and Elevated Platforms Other Than Exits: Uniform load of 60 lb/square foot.
    - b. Walkways and Elevated Platforms Used as Exits: Uniform load of 100 lb/square foot.
    - c. Forklift: 3 ton capacity
  - 2. Provide grating products with a flame spread rating of 25 or less per ASTM E84 Tunnel Test. Test gratings for burn time of less than 30 seconds and an extent of

burn rate of less than or equal to 10 millimeters per ASTM D635.

### 2.3 MOLDED FRP GRATING

- A. Ensure that all field-fabricated and shop-fabricated grating cuts are coated with resin to provide maximum corrosion resistance in accordance with the manufacturer's instructions.
- B. Provide grating made as one-piece molded construction with tops and bottoms of bearing bars and cross bars in the same plane with a rectangular mesh pattern providing unidirectional strength and reinforced with continuous roving of an equal number of layers in each direction.
- C. Ensure that the top layer of reinforcement is no more than 1/8 inch below the top surface of the grating to provide maximum stiffness and prevent resin chipping of unreinforced surfaces having percentage of glass (by weight) not exceeding 35 percent.
- D. Ensure that no dry glass fibers are visible on any surface of bearing bars or cross bars after molding, and that all bars are smooth and uniform, with no evidence of fiber orientation irregularities, interlaminar voids, porosity, resin-rich areas or resin-starved areas.
- E. Provide nonslip surfacing manufactured with a concave, meniscus profile on the top of each bar providing maximum slip resistance.
- F. Fillet grating bar intersections to a minimum radius of 1/16 inch to eliminate local stress concentrations and the possibility of resin cracking at these locations.

### 2.4 FASTENERS

- A. Provide Type 316 stainless-steel fasteners, clips, and anchorage for exterior use.

## EXECUTION

### 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

### 3.2 INSTALLATION

- A. Install items at locations indicated, according to the manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Include all materials and parts necessary to complete each item, even though such work is not definitely shown or specified.
- B. Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines; and levels and free of rack.
- C. Comply with recommendations of cited bar grating standards, including installation clearances and standard anchoring details.
  - 1. Attach removable units to supporting members with the type and size of clips and fasteners indicated or, if not indicated, as recommended by the grating manufacturer for the type of installation conditions shown.
- D. Anchorage, Fastenings, and Connections
  - 1. Provide anchorage where necessary for fastening miscellaneous FRP items securely in place.

## END OF SECTION

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**SECTION 068400 - FRP LADDERS**

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Fiber Reinforced Plastic Ladders.

## 1.2 RELATED REQUIREMENTS

## 1.3 REFERENCE STANDARDS

- A. ALI A14.3 - Ladders - Fixed - Safety Requirements; 2018.
- B. ASTM D430 - Standard Test Methods for Rubber Deterioration - Dynamic Fatigue; 2012.
- C. ASTM D495 - Standard Test Method for High-Voltage, Low-Current, Dry Arc Resistance of Solid Electrical Insulation; 2004.
- D. ASTM D1148 - Standard Test Method for Rubber Deterioration-Discoloration from Ultraviolet (UV) or UV/Visible Radiation and Heat Exposure of Light-Colored Surfaces; 2018.
- E. ASTM D4000 - Standard Classification System for Specifying Plastic Materials; 2016.
- F. 29 CFR 1910.27 - Scaffolds and Rope Descent Systems Current Edition.
- G. 29 CFR 1926 - U.S. Occupational Safety and Health Standards current edition.
- H. ASCE 7-16 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures 2016.
- I. ASTM D2344/D2344M - Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates 2016.
- J. ASTM D638 - Standard Test Method for Tensile Properties of Plastics 2014.
- K. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between - 30 C and 30 C with a Vitreous Silica Dilatometer 2016.
- L. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials 2017.
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021.
- N. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

## 1.4 SUBMITTALS

- A. Product Data: Provide Manufacturer's Catalog Data.
- B. Shop Drawings: Provide Fabrication and Installation Drawings and Details.
- C. Certificates: Manufacturer's Sample Warranty
- D. Test Reports: Provide Ultraviolet Testing, Thermal Expansion, and Flame Spread.
- E. Manufacturer's Instructions: Provide Manufacturer's Recommendations.
- F. Closeout Submittals: Manufacturer's Warranty

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all manufactured materials in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturers, clearly marked and identified relative to the complete system. Provide all adhesives, resins, and their catalysts and hardeners in clearly marked or noted crates or boxes. Store all manufactured materials in a dry indoor facility with a constant temperature range between 70 and 85 degrees F until they are required.

- B. Submit manufacturers recommendations for shipping and handling. Handle all materials to prevent abrasion, cracking, chipping, twisting, or other deformations and other types of damage.

**PART 2 PRODUCTS**

**2.1 FRP LADDER SYSTEM**

**A. Description:**

1. Provide a system that includes ladder side rails, rungs, mounting brackets, and related safety rail systems that are FRP structural shapes manufactured to comply with or exceed the standards listed in this section.
2. Standard details indicating the physical requirements of the FRP ladders are located in the Construction Drawings.

**B. Design Criteria:**

1. Provide fiberglass reinforcement that is a combination of continuous roving, continuous strand mat, bidirectional roving mat, and surfacing veil in sufficient quantities as required. Clearly identify components as specified in ASTM D400.
2. Provide finished surfaces of FRP items that are smooth, resin-rich, and free of voids, dry spots, cracks, crazes or reinforced areas. Provide a system that is completely covered with resin protection against wear, weathering, and damage from ultraviolet light.
3. Provide FRP ladder that have a tested flame spread rating of 25 or less as specified in ASTM E84 Tunnel Test, with a ladder system meeting the minimum requirements of ASTM D430 and ASTM D495.
4. Provide 316 stainless steel bolts for attaching ladder cage vertical bars to hoops, ladder hoops to brackets, ladder cage brackets to the ladder, wall brackets to the ladder, and landing safety rails to the system. Mechanically attach all rungs to the ladder with 18-8 stainless steel rivets, and chemically bond with resin.
5. Fabricate ladder side rails of a continuous pultruded, 1-3/4 inch square tube with a minimum wall thickness of 1/4 inch or greater. Fabricate ladder rungs to be 1-1/4 inch diameter pultruded structural shapes, continuously fluted to provide a nonslip surface. Rungs that are gritted as a secondary operation are not permitted. Fit the rungs in the centerline of the side rails.
6. Fabricate ladder walls and floor mounts from pultruded angles, 3/8 inch minimum thickness. Mechanically attach all ladder rungs to ladder side rails by use of stainless steel rivets and a chemical bond of epoxy.
7. Protect all pultruded ladder components from ultraviolet attack by providing integral UV inhibitors in the resin and a synthetic surfacing veil to help produce a resin rich surface.

**C. Performance:**

1. Provide a ladder system that meets the minimum longitudinal mechanical properties as follows:

Tensile Strength	ASTM D638	30,000 psi
Tensile Modulus	ASTM D638	2,500,000 psi
Flexural Strength	ASTM D790	30,000 psi
Flexural Modulus	ASTM D790	1,800,000 psi
Flexural Modulus - Full Section	N/A	2,800,000 psi
Short Beam Shear	ASTM D2344/D2344M	4,500 psi
Shear Modulus - Transverse	N/A	450,000 psi
Coefficient of Thermal Expansion	ASTM D696	0.000008 in/in/F



Flame Spread	ASTM E84	25 or less
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2. Structural Performance
  - a. Provide ladders capable of withstanding the effects of gravity loads as specified in ASCE 7-16 and the International Building Code, as well a loads and stresses withing the limits and under conditions specified in 29 CFR 1910.27 and ALI A14.3.
  - b. Provide ladders that are able to support a concentrated vertical load of 1200 pounds applied at mid-span of the rung.
3. Thermal Movements
  - a. Provide exterior metal fabrications that withstand thermal movements resulting from maximum change between 120 degrees F (ambient) and 180 degrees F (material surface). Prevent buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
4. Safety Performance
  - a. Provide ladders that fully comply with NFPA 101, OSHA 29 CFR 1910.27, and ALI A14.3 for distance between rungs, cleats, and steps and for minimum clearances for cages and climbing space.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install FRP ladders in accordance with the approved detail drawings and descriptive data, in conformance with 29 CFR 1926, and as specified.
- B. Assemble and install ladder systems and all components in strict accordance with the manufacturer's assembly documentation. Seal cut or drilled surfaces in accordance with the manufacturer's instructions. Provide adequate ventilation during all drilling, cutting, and resin application procedures.
- C. Fabrication
  1. Ensure that the design and layout of ladders and safety cages complies with ALI A14.3 and OSHA 29 CFR 1910.27. Ensure that all ladder rungs penetrate the tube side wall of the ladder rails. Provide ladder rung connections that are both chemically locking epoxy and mechanically locking rivets.
  2. Fully shop-assemble ladders. Test-assemble safety cages; drill and fit to ensure proper field assembly. Leave safety cage brackets attached with bolts to the ladder for shipping, but disassemble ladder cage components. Package and ship each set of cage components with each respective ladder.
  3. Field-attach hoops to the brackets. Seal all cut, machined edges, holes, and notched to provide maximum corrosion resistance. Coat all field-fabricated cuts in accordance with the manufacturer's instructions.
- D. Fastening to Construction-In-Place
  1. Provide anchorage devices and fasteners where necessary for fastening fabricated FRP items to construction-in-place.
  2. Provide threaded fasteners for concrete inserts embedded in cast-in-place concrete.
  3. Provide masonry anchorage devices and threaded fasteners for solid masonry and concrete-in-place.
  4. Provide toggle bolts for hollow masonry and stud partitions.
  5. Provide through-bolting for masonry and wood construction.
  6. Provide lag bolts and wood screws for wood construction.
  7. Provide connections for structural steel.

3.2 CLOSEOUT ACTIVITIES

3.3 PROTECTION

- A. Protect installed ladders from subsequent construction operations.

END OF SECTION

## SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Polyurethane waterproofing.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Show locations and extent of waterproofing.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

#### 1.6 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SINGLE-COMPONENT POLYURETHANE WATERPROOFING

- A. Single-Component, Modified Polyurethane Waterproofing: ASTM C836/C836M and coal-tar free.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Carlisle Coatings & Waterproofing Inc.
    - b. Polyguard Products, Inc.
    - c. Tremco Incorporated.

2.2 AUXILIARY MATERIALS

- A. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated.
- B. Sheet Flashing: 50-mil- (1.3-mm-) minimum, nonstaining, uncured sheet neoprene.
  - 1. Adhesive: Manufacturer's recommended contact adhesive.
- C. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric.
- D. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- E. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; and as recommended by manufacturer for substrate and joint conditions.
  - 1. Backer Rod: Closed-cell polyethylene foam.

2.3 INSULATION DRAINAGE PANELS

- A. Unfaced, Wall-Insulation Drainage Panels: Extruded-polystyrene board insulation according to ASTM C578, Type VI, 40-psi (276-kPa) minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Dow Chemical Company (The).
    - b. Insulfoam; Carlisle Construction Materials Company.
    - c. Owens Corning.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D4258.
- F. Install sheet flashing and bond to deck and wall substrates where required according to waterproofing manufacturer's written instructions.

### 3.2 WATERPROOFING APPLICATION

- A. Apply waterproofing according to manufacturer's written instructions and to recommendations in ASTM C1471/C1471M.
- B. Reinforced Waterproofing Applications.
  - 1. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases and pinholes, with an average dry film total thickness of 120 mils (3 mm).
- C. Install protection course with butted joints over waterproofing before starting subsequent construction operations.
  - 1. For horizontal applications, install protection course loose laid over fully cured membrane.
  - 2. For vertical applications, set protection course in nominally cured membrane, which will act as an adhesive. If membrane cures before application of protection course, use adhesive.
  - 3. Insulation drainage panels may be used in place of a separate protection course for vertical applications when approved in writing by waterproofing manufacturer.

### 3.3 INSULATION DRAINAGE PANEL INSTALLATION

- A. Install drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.
- B. Ensure that drainage channels are aligned and free of obstructions.
- C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.
- D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

### 3.4 PROTECTION

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION 071416

SECTION 072100 – THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation. (See section 071416 for foundation insulation spec).
2. Polyisocyanurate foam-plastic board insulation for wall cavity. (See sec. 075423 for roof insulation)
3. Glass-fiber blanket insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Polyisocyanurate foam-plastic board insulation.
2. Glass-fiber blanket insulation.

1.3 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

1. Sign, date, and post the certification in a conspicuous location on Project site.

B. Product test reports.

C. Research reports.

PART 2 - PRODUCTS

2.1 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

A. Polyisocyanurate Board Insulation, Foil Faced (cavity wall): ASTM C1289, foil faced, Type I, Class 1 or 2.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Dow Chemical Company (The).
- b. Firestone Building Products.

c. Johns Manville; a Berkshire Hathaway company.

2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.

## 2.2 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Kraft Faced: ASTM C665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. CertainTeed Corporation; Saint-Gobain North America.
  - b. Johns Manville; a Berkshire Hathaway company.
  - c. Owens Corning.
2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.

## 2.3 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Install insulation with manufacturer's R-value label exposed after insulation is installed.



- D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

### 3.2 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
  - 1. If not otherwise indicated, extend insulation a minimum of 36 inches (915 mm) below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
  - 1. If not otherwise indicated, extend insulation a minimum of 36 inches (915 mm) in from exterior walls.

### 3.3 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

### 3.4 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face and as recommended by manufacturer.
  - 1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
  - 2. Press units firmly against inside substrates.
  - 3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose.

### 3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  4. For wood-framed construction, install blankets according to ASTM C1320 and as follows:
    - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
  5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
    - a. Exterior Walls: Set units with facing placed toward exterior of construction.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of A 2.5 lb/cu. ft. (40 kg/cu. m).
  2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

END OF SECTION 072100

SECTION 072413 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. EIFS-clad barrier-soffit assemblies that are field applied over substrate.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each EIFS component, trim, and accessory.
- B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer certificates.
- B. Product certificates.
- C. Product test reports.
- D. Field quality-control reports.
- E. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by AWCI International as qualified to install Class PB EIFS using trained workers.

## 1.7 WARRANTY

- A. **Manufacturer's Special Warranty:** Manufacturer agrees to repair or replace components of EIFS that fail in materials or workmanship within specified warranty period.
1. **Warranty Period:** 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Dryvit Systems, Inc.
  2. Parex USA, Inc.
  3. Sto Corp.

### 2.2 PERFORMANCE REQUIREMENTS

- A. **EIFS Performance:** Comply with ASTM E2568 and with the following:
1. **Weathertightness:** Resistant to water penetration from exterior.
  2. **Impact Performance:** ASTM E2568, High impact resistance.

### 2.3 EIFS MATERIALS

- A. **Flexible-Membrane Flashing:** Cold-applied, self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
- B. **Insulation Adhesive:** EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate.
- C. **Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation:** Comply with ASTM E2430/E2430M.
1. **Foam Buildouts:** Provide with profiles and dimensions indicated on Drawings.
- D. **Reinforcing Mesh:** Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multi-end strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) according to ASTM E2098/E2098M.
1. **Reinforcing Mesh for EIFS, General:** Not less than weight required to comply with impact-performance level specified in "Performance Requirements" Article.

- E. Base Coat: EIFS manufacturer's standard mixture.
- F. Water-Resistant Base Coat: EIFS manufacturer's standard waterproof formulation.
- G. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- H. Finish Coat: EIFS manufacturer's coating as per Basis of Design Product indicated on the drawings or equivalent product with same finish appearance and performance as the Basis of Design Product. Architect will be the judge as to its equivalency.
  - 1. Colors: As indicated on the drawings.
  - 2. Textures: Match Architect's sample.
- I. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D1784 and ASTM C1063.

## PART 3 - EXECUTION

### 3.1 EIFS INSTALLATION

- A. Comply with ASTM C1397, ASTM E2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate.
- B. Flexible-Membrane Flashing: Apply and lap to shed water; seal at openings, penetrations, and terminations. Prime substrates with flashing primer if required and install flashing.
- C. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, and elsewhere as indicated. Coordinate with installation of insulation.
- D. Board Insulation: Adhesively attach insulation to substrate in compliance with ASTM C1397.
  - 1. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch (0.8 mm) from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch (1.6 mm). Prevent airborne dispersal and immediately collect insulation raspings or sandings.
  - 2. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS lamina.
- E. Expansion Joints and control joints: Install at locations indicated and where required by EIFS manufacturer using manufacturers standard details. Submit joint pattern if required for Architects approval.
- F. Water-Resistant Base Coat: Apply full-thickness coverage to exposed surfaces of sloped shapes foam buildouts and trim and to other surfaces indicated on Drawings.

- G. Base Coat: Apply full coverage to exposed insulation and foam buildouts with not less than 1/16-inch (1.6-mm) dry-coat thickness.
- H. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C1397. Do not lap reinforcing mesh within 8 inches (200 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.
- I. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C1397 in same manner as first application. Do not apply until first base coat has cured.
- J. Additional Reinforcing Mesh: Apply strip-reinforcing mesh around openings, extending 4 inches (100 mm) beyond perimeter. Apply additional 9-by-12-inch (230-by-300-mm) strip-reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- (200-mm-) wide, strip-reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches (100 mm) on each side of corners.
- K. Foam Buildouts: Fully embed reinforcing mesh in base coat.
- L. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application, except without reinforcing mesh. Do not apply until first base coat has cured. Double base required for exposed vertical surfaces.
- M. Finish Coat: Apply full-thickness coverage over dry primed base coat, maintaining a wet edge at all times for uniform appearance, to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
- N. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.
- O. Install all components of EIFS system in accordance with manufacturer installation instructions and specifications and as per the drawings and specifications. The most stringent requirements will govern in case of conflict.

### 3.2 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Engage a qualified testing agency to perform tests and inspections noted below as Owners responsibility to be paid under the inspections and testing allowance of Section 012100, Allowances.
- B. EIFS Tests and Inspections: According to ASTM E2568.
- C. EIFS will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.

END OF SECTION 072413

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## SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Standing-seam metal roof panels.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Sample of special warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

Verify available warranties and warranty periods for units and components made by manufacturers listed in Part 2 articles.

- 1. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.
  - 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
  - 1. Uplift Rating: UL 90.
- D. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
  - 1. Fire/Windstorm Classification: Class 1A- 105.

Retain one option in "Hail Resistance" Subparagraph below. For areas that experience three or more hailstorms annually, FM Global recommends roofing systems rated SH (severe hail) instead of MH (moderate hail).

2. Hail Resistance: MH.

- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

Differential values (for aluminum in particular) in "Temperature Change (Range)" Subparagraph below are suitable for most of the U.S.; revise to suit Project.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 2.2 STANDING-SEAM METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.

- B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels (on dumpster enclosure): Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Architectural Metal Systems.
- b. CENTRIA.
- c. BERRIDGE

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

- a. Nominal Thickness: 0.028 inch
- b. Exterior Finish: Three-coat fluoropolymer.
- c. Color: Match Architect's samples.

3. Clips: One-piece fixed to accommodate thermal movement.
  - a. Material: 0.028-inch- (0.71-mm-) nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
4. Panel Coverage: 16 inches (406 mm).
5. Panel Height: 1.5 inches (38 mm).

### 2.3 UNDERLAYMENT MATERIALS

Underlayments listed in "Self-Adhering, High-Temperature Underlayment" Paragraph below are suitable for higher temperatures associated with metal roofing. Revise if high-temperature underlayments are not required. Verify, with underlayment manufacturer, acceptability for use on roofs with slopes less than 2:12.

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
  1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D1970.
  2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D1970.
  3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Carlisle WIP Products; a brand of Carlisle Construction Materials.
    - b. Owens Corning.
    - c. Polyglass U.S.A., Inc.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

### 2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
  2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match metal roof panels roof fascia and rake trim.
- E. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
  2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
  3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

## 2.5 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

## 2.6 FINISHES

- A. Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

### 3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.

### 3.3 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

- A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Watertight Installation:
  - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
  - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
  - c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. 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.

#### 3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074113.16

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## SECTION 074213.13 - FORMED METAL WALL PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal wall panels.
2. Concealed-fastener, lap-seam metal wall panels.
3. Metal liner panels.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Samples of special warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.
  - 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 CONCEALED-FASTENER METAL WALL PANELS

- A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through

panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

- B. Pan-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges on all four sides and a flat pan appearance between panel edges; with caulk joint between panels. Use channel receiver strips on four sides with fasteners covered by sealant creating a 1/2" joint on all four sides. Similar attachments can be submitted. Attachment must be watertight and concealed.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Architectural Metal Systems.
    - b. Berridge Manufacturing Company.
    - c. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
  2. Aluminum Sheet: Coil-coated sheet, ASTM B209 (ASTM B209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
    - a. Thickness: 0.032 inch (0.81 mm) or 0.040 inch (1.02 mm). Depending on size of panel and as recommended by manufacturer.
    - b. Surface: Smooth, flat finish.
    - c. Exterior Finish: Three-coat fluoropolymer.
    - d. Color: Match Architect's samples.
  3. Panel Coverage: As shown on the elevation drawings.
  4. Panel Height: 1.5 inches (38 mm).

### 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, perimeter of removable wood framed panel allowing panel removal, bases, drips, sills, jambs, corners, end walls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- C. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

- D. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
  - 2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer or in compliance with Sealants specification section.

## 2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

## 2.5 FINISHES

- A. Panels and Accessories:
  - 1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.
  - 2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

### 3.2 INSTALLATION

- A. Watertight Installation:
  - 1. Apply a continuous ribbon of sealant or tape to seal lapped joints or channel joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
  - 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.

- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. 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 are permanently watertight.

### 3.3 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074213.13

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## SECTION 075423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Adhered thermoplastic polyolefin (TPO) roofing system.
2. Substrate board.(at canopies)
3. Roof insulation.
4. Walkways.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane termination details.
3. Flashing details at penetrations.
4. Tapered insulation layout, thickness, and slopes.
5. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
6. Tie-in with adjoining air barrier.

- C. Samples: For the following products:

1. Roof membrane and flashings, of color required. (LIGHT GREY)
2. Walkway pads or rolls, of color required. (LIGHT GREY)

- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

- a. Submit evidence of compliance with performance requirements.
  - 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
  - B. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
  - C. Research reports.
  - D. Field Test Reports:
    - 1. Concrete internal relative humidity test reports.
    - 2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
  - E. Field quality-control reports.
  - F. Sample warranties.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance data.
- 1.6 QUALITY ASSURANCE
- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. Master Select or Equivalent Installer.
- 1.7 WARRANTY
- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
    - 1. Warranty Period: 30 years from date of Substantial Completion. (No Dollar Limit)

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
- B. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.



- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
- D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
  - 1. Fire/Windstorm Classification: Class 1A-90.
  - 2. Hail-Resistance Rating: As per the Basis of Design Product listed.
- E. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
  - 1. Wind Uplift Load Capacity: 105 psf but not less than basis of design product.
- F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

## 2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

- A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced, fabric-backed TPO sheet.
- B. Basis of Design Product: GAF EverGuard 80- (30 year warranty)
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Firestone Building Products.
    - b. GAF.
    - c. Johns Manville; a Berkshire Hathaway company.
  - 2. Thickness: 80 mils (2.0 mm), nominal.
  - 3. Exposed Face Color: Gray.

## 2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
  - 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as TPO sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Bonding Adhesive: Manufacturer's standard.
- E. Slip Sheet: Manufacturer's standard, of thickness required for application.
- F. 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.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- H. 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.

## 2.4 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M, fiber-reinforced gypsum board.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. CertainTeed Corporation; Saint-Gobain North America.
    - b. National Gypsum Company.
    - c. USG Corporation.
  - 2. Thickness: Type X, 5/8 inch (16 mm) thick.
  - 3. Surface Finish: Factory primed.
- 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.

## 2.5 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 2, Grade 3, felt or glass-fiber mat facer on both major surfaces.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Firestone Building Products.

- b. GAF.
  - c. Johns Manville; a Berkshire Hathaway company.
2. Size: 48 by 48 inches (1219 by 1219 mm).
  3. Thickness:
    - a. Base Layer: 3"
    - b. Upper Layer: 3"

B. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch (6.35 mm).
3. Slope:
  - a. Roof Field: 1/4 inch per foot (1:48) unless other wise indicated on the drawings.
  - b. Saddles and Crickets: 1/4" per foot unless otherwise indicated on Drawings.

## 2.6 INSULATION ACCESSORIES

- A. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
1. Full-spread, spray-applied, low-rise, two-component urethane adhesive.

## 2.7 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick and acceptable to roofing system manufacturer.
1. Size: Approximately 36 by 60 inches (914 by 1524 mm).
  2. Color: Contrasting with roof membrane.
  3. Colors and Textures: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
1. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
  2. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.

- a. Test Frequency: One test probe per each 1000 sq. ft. (93 sq. m), or portion thereof, of roof deck, with not less than three tests probes.
  - b. Submit test reports within 24 hours after performing tests.
3. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
  4. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.

### 3.2 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.
- C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 071416 Cold Fluid applied water proofing.

### 3.3 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches (610 mm) in adjacent rows.
  1. At steel roof decks, install substrate board at right angle to flutes of deck.
    - a. Locate end joints over crests of steel roof deck.
  2. Tightly butt substrate boards together.
  3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
  4. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

### 3.4 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Concrete Decks:

1. Install base layer of insulation with joints staggered not less than 24 inches (610 mm) in adjacent rows.
  - a. 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.
  - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
  - c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
  - d. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
  - e. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
  - f. Adhere base layer of insulation to concrete roof deck according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
    - 1) Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
  
2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches (305 mm) from previous layer of insulation.
  - a. Staggered end joints within each layer not less than 24 inches (305 mm) in adjacent rows.
  - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
  - c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
  - d. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
  - e. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
  - f. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
    - 1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

### 3.5 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.

- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel and Owner's testing and inspection agency.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, 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 roof membrane and sheet flashings.
  - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
  - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

### 3.6 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

### 3.7 INSTALLATION OF WALKWAYS

- A. Flexible Walkways:
  - 1. Install flexible walkways at the following locations:

- a. Retain one or more subparagraphs below. Revise to suit Project.
  - b. Perimeter of each rooftop unit.
  - c. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
  - d. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
  - e. Top and bottom of each roof access ladder.
  - f. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
  - g. Locations indicated on Drawings.
  - h. As required by roof membrane manufacturer's warranty requirements.
- 2. Provide 6-inch (76-mm) clearance between adjoining pads.
  - 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

### 3.8 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system 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 roofing system that does not comply with requirements, repair substrates, and repair or reinstall 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 075423

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## SECTION 076200 - SHEET METAL FLASHING AND TRIM

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed wall sheet metal fabrications.

## 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

## 1.3 ACTION SUBMITTALS

## A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Epoxy seam sealer.

## B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.

- C. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long by actual width.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.
- B. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.
- C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Special warranty.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
  - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install copings roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
  - 1. Design Pressure: As indicated on the Structural Drawings.
- D. FM Approvals Listing: Manufacture and install copings roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, see structural dwgs. Identify materials with name of fabricator and design approved by FM Approvals.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

### 2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
  - 1. Exposed Coil-Coated Finish:
    - a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to

exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: Match Architect's sample.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

## 2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Carlisle WIP Products: a brand of Carlisle Construction Materials.
    - b. GCP Applied Technologies Inc.
    - c. Owens Corning.
  2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C) or lower.
- B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

## 2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.

- c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

Retain "Epoxy Seam Sealer" Paragraph below if required for aluminum sheet without painted or coated finish.

- E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- F. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Fry Reglet Corporation.
    - b. Heckmann Building Products, Inc.
    - c. National Sheet Metal Systems, Inc.
  2. Material: Stainless steel, 0.0188 inch: (0.477 mm) thick Aluminum, 0.024 inch (0.61 mm) thick.

Retain one or more reglet types and accessories from "Surface-Mounted Type," "Stucco Type," "Concrete Type," "Masonry Type," and "Accessories" subparagraphs below to suit Project.

3. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
4. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
6. Accessories:
  - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.

- b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
7. Finish: With manufacturer's standard color coating.

## 2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
  1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
  4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
  1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams:
  1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

## 2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

### A. Hanging Gutters:

1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in minimum 96-inch- (2400-mm-) long sections.
3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness.
4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
5. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
  - a. Aluminum: 0.032 inch (0.81 mm) thick.
6. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following materials:
  - a. Aluminum: 0.040 inch (1.02 mm) thick.
7. Gutters with Girth 21 to 25 Inches (530 to 640 mm): Fabricate from the following materials:
  - a. Aluminum: 0.050 inch (1.27 mm) thick.

### B. Downspouts: Fabricate rectangular downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Hanger Style: concealed.
2. Fabricate from the following materials:
  - a. Aluminum: 0.024 inch (0.61 mm) thick.

### C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:

1. Aluminum: 0.032 inch (0.81 mm) thick.

### D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, exterior flange trim. Fabricate from the following materials:

1. Aluminum: 0.032 inch (0.81 mm) thick.

### E. Splash Pans: Fabricate to dimensions and shape required and from the following materials:

1. Aluminum: 0.040 inch (1.02 mm) thick.

## 2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.
  - 1. Fabricate from the following materials:
    - a. Aluminum: 0.050 inch (1.27 mm) thick.
- B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
  - 1. Fabricate from the following materials:
    - a. Aluminum: 0.050 inch (1.27 mm) thick.
- C. Base Flashing: Fabricate from the following materials:
  - 1. Aluminum: 0.040 inch (1.02 mm) thick.
- D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
  - 1. Stainless Steel: 0.0188 inch (0.477 mm) thick.
- F. Roof-Drain Flashing: Fabricate from the following materials:
  - 1. Stainless Steel: 0.0156 inch (0.396 mm) thick.

## 2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
  - 1. Stainless Steel: 0.0156 inch (0.396 mm) thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- C. Wall Expansion-Joint Cover: Fabricate from the following materials:
  - 1. Aluminum: 0.040 inch (1.02 mm) thick.



## PART 3 - EXECUTION

### 3.1 INSTALLATION OF UNDERLAYMENT

- A. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
1. Lap horizontal joints not less than 4 inches (100 mm).
  2. Lap end joints not less than 12 inches (300 mm).
- B. Self-Adhering, High-Temperature Sheet Underlayment:
1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
  2. Prime substrate if recommended by underlayment manufacturer.
  3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
  4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses.
  5. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller.
  6. Roll laps and edges with roller.
  7. Cover underlayment within 14 days.
- C. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.
1. Install in shingle fashion to shed water.
  2. Lapp joints not less than 4 inches (100 mm).

### 3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of welds or sealant.
  3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
  4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
  5. Install continuous cleats with fasteners spaced not more than 12 inches (300 mm) o.c.
  6. Space individual cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.

7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
  8. Do not field cut sheet metal flashing and trim by torch.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
  2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
  3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated.
    - a. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant.
    - b. Form joints to completely conceal sealant.
    - c. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.
    - d. Adjust setting proportionately for installation at higher ambient temperatures.
      - 1) Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
  2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
2. Do not solder aluminum sheet.
3. Stainless Steel Soldering:
  - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
  - b. Promptly remove acid-flux residue from metal after tinning and soldering.
  - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

### 3.3 INSTALLATION OF ROOF-DRAINAGE SYSTEM

- A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters:
  1. Join sections with riveted and soldered joints or joints sealed with sealant.
  2. Provide for thermal expansion.
  3. Attach gutters at eave or fascia to firmly anchor them in position.
  4. Provide end closures and seal watertight with sealant.
  5. Slope to downspouts.
  6. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet (15.2 m) apart. Install expansion-joint caps.
- C. Downspouts:
  1. Join sections with 1-1/2-inch (38-mm) telescoping joints.
  2. Provide hangers with fasteners designed to hold downspouts securely to walls.
  3. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
  4. Provide elbows at base of downspout to direct water away from building.
  5. Connect downspouts to underground drainage system where noted on drawings.
- D. Splash Pans:
  1. Install where downspouts discharge on low-slope roofs and canopies.
  2. Set in elastomeric sealant compatible with the substrate.
- E. Parapet Scuppers:
  1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
  2. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
  3. Loosely lock front edge of scupper with conductor head.

4. Seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.
- F. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch (25 mm) below scupper discharge.
- G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

### 3.4 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
  1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
  2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing:

Retain one of three subparagraphs below; revise to suit Project. Retain first if Project is governed by the IBC or if ANSI/SPRI/FM 4435/ES-1 testing sets a minimum quality standard. Retain second if Project is FM Global insured or if FM Global requirements set minimum installation standard. FM Global requirements depend on specific roof edge and flashing configurations.

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
  2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
  3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- C. Copings:
    1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
    2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.
      - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch (400-mm) centers.
      - b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers.

- 3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
  - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
  - 2. Extend counterflashing 4 inches (100 mm) over base flashing.
  - 3. Lap counterflashing joints minimum of 4 inches (100 mm).
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

### 3.5 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.
- C. Reglets: Installation of reglets is specified in Section 042000 "Unit Masonry."

### 3.6 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

### 3.7 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

### 3.8 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

## SECTION 077200 - ROOF ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Roof curbs.
  - 2. Roof hatches.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.5 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Custom Solution Roof and Metal Products.
  - b. Greenheck Fan Corporation.
  - c. LMCurbs.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Stainless steel sheet, 0.0781 inch (1.983 mm) thick.
- 1. Finish: Manufacturer's standard.
- D. Construction:

Revise subparagraphs below to suit Project and required curb configurations and curb accessories. Insert other features such as counterflashing if required.

- 1. Curb Profile: Manufacturer's standard compatible with roofing system.
- 2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
- 3. Fabricate curbs to minimum height of 12 inches (305 mm) above roofing surface unless otherwise indicated.
- 4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
- 5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
- 6. Insulation: Factory insulated with 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
- 7. Liner: Same material as curb, of manufacturer's standard thickness and finish.
- 8. Nailer: Factory-installed wood nailer under top flange on side of curb, continuous around curb perimeter.
- 9. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
- 10. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- (19-mm-) thick plywood covered with metal sheet of same type, thickness, and finish as required for curb. Verify with mech. engineer.
- 11. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.
- 12. Security Grille: Provide for all units.
- 13. Damper Tray: Provide damper tray or shelf with opening of size required by mechanical engineer.

## 2.2 ROOF HATCHES

- A. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb



counterflashing and weathertight perimeter gasketing and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Architectural Specialties, Inc.
  - b. BILCO Company (The).
  - c. Custom Solution Roof and Metal Products.
2. Type and Size: Single-leaf lid, size as indicated on Drawings.
3. Loads: Minimum 40-lbf/sq. ft. (1.9-kPa) external live load and 30-lbf/sq. ft. (1.4-kPa) internal uplift load.
  - a. When release is actuated, lid shall open against 10-lbf/sq. ft. (0.5-kPa) snow or wind load and lock in position.
4. Curb, Framing, and Lid Material: Aluminum sheet.
  - a. Thickness: Manufacturer's standard thickness for hatch size indicated.
  - b. Finish: Two-coat fluoropolymer.

Retain "Color" Subparagraph below if retaining any of last three options in "Finish" Subparagraph above.

- c. Color: As selected by Architect from manufacturer's full range.
5. Construction:

Retain one material option in "Insulation" Subparagraph below; options are presented in ascending order of cost and thermal resistance; third option for high-performing insulation is available from several of the listed manufacturers.

- a. Insulation: 3-inch- (50-mm-) thick, polyisocyanurate board.
  - b. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
  - c. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
  - d. Exterior Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
  - e. Fabricate curbs to minimum height of 12 inches (305 mm) above roofing surface unless otherwise indicated.
  - f. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.
6. Hardware: Manufacturer's standard stainless steel; with hinges, hold-open devices, and independent manual-release devices for inside operation of lids.

## 2.3 METAL MATERIALS

- A. Aluminum Sheet: ASTM B209 (ASTM B209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
  - 1. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    - a. Two-Coat Fluoropolymer Finish: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.
  - 2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- B. Aluminum Extrusions and Tubes: ASTM B221 (ASTM B221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.
- C. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.

## 2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
- C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.
- D. Underlayment:
  - 1. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
- E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- G. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

- H. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.
  - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
  - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
  - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
  - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
- C. Seal joints with elastomeric sealant as required by roof accessory manufacturer.

### 3.2 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

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## SECTION 078413 - PENETRATION FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:
  - a. Penetrations in fire-resistance-rated walls.
  - b. Penetrations in horizontal assemblies.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

- a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
  - 1) UL in its "Fire Resistance Directory."

## 2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. 3M Fire Protection Products.
    - b. Hilti, Inc.
    - c. International Fireproof Technology Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
  1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
  1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
- D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

- B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- D. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
  - 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.2 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
  - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

### 3.3 FIELD QUALITY CONTROL

- A. Owner Engage a qualified testing agency to perform tests and inspections noted below as Owners responsibility to be paid under the inspections and testing allowance of Section 012100, Allowances.
- B. Testing according to ASTM E2174.

- C. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- D. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078413



## SECTION 078443 - JOINT FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
  - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
    - 1) UL in its "Fire Resistance Directory."

## 2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. 3M Fire Protection Products.
    - b. Clark Dietrich.
    - c. International Fireproof Technology Inc.
  2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
  3. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.
- C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- D. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

- B. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- C. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- D. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
  - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
  - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.2 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

### 3.3 FIELD QUALITY CONTROL

- A. Inspecting Agency: Engage a qualified testing agency to perform tests and inspections noted below as Owners responsibility to be paid under the inspections and testing allowance of Section 012100, Allowances.
- B. Inspections according to ASTM E2393.
- C. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- D. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078443

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## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Non-staining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Latex joint sealants.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.

- B. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Preconstruction laboratory test reports.
- C. Preconstruction field-adhesion-test reports.
- D. Field-adhesion-test reports.
- E. Sample warranties.

#### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

## 1.6 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### 2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Pecora Corporation.
    - b. Sika Corporation; Joint Sealants.
    - c. Tremco Incorporated.
- C. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. The Dow Chemical Company.

- D. Silicone, Nonstaining, M, NS, 50, NT: Nonstaining, multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type M, Grade NS, Class 50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Tremco Incorporated.

### 2.3 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Pecora Corporation.
    - b. The Dow Chemical Company.
    - c. Tremco Incorporated.
- C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Pecora Corporation.
    - b. Sherwin-Williams Company (The).
    - c. Tremco Incorporated.

### 2.4 JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Alcot Plastics Ltd.

- b. Construction Foam Products; a division of Nomaco, Inc.
- c. Master Builders Solutions.

- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

## 2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove laitance and form-release agents from concrete.
  - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

### 3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind 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.



- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that 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 in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 1. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

### 3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
  - 1. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
  - 1. Joint Locations:
    - a. Isolation and contraction joints in cast-in-place concrete slabs.
    - b. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone S, NS, 100/50, T, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
  - 1. Joint Locations:

- a. Construction joints in cast-in-place concrete.
    - b. Joints between plant-precast architectural concrete units.
    - c. Control and expansion joints in unit masonry.
    - d. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
- 1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in tile flooring.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Non staining Silicone S, NS, 100/50, T, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
- 1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Tile control and expansion joints.
    - c. Vertical joints on exposed surfaces of unit masonry concrete walls and partitions.
    - d. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Non staining Silicone S, NS, 100/50, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
- 1. Joint Locations:
    - a. Control joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Acrylic latex.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

- a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
- b. Tile control and expansion joints where indicated.
- c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

G. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:

- a. Aluminum thresholds.
- b. Sill plates.
- c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based. Submit proposed manufacturer and product info.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

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## SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

### 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. Interior standard steel doors and frames.
  - 2. Exterior standard steel doors and frames.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field quality control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Apex Industries, Inc.
2. Ceco Door; ASSA ABLOY.
3. Corrim Company.
4. Mesker Door Inc.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.50 deg Btu/F x h x sq. ft. (2.84 W/K x sq. m) when tested according to ASTM C518.

## 2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule.

### 1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches (44.5 mm).
- c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
- d. Edge Construction: Model 2, Seamless.
- e. Core: Manufacturer's standard.
- f. Fire-Rated Core: Manufacturer's standard vertical steel stiffener laminated mineral board core for fire-rated doors.

### 2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
- b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
- c. Construction: Full profile welded.

## 2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule.

### 1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches (44.5 mm).
- c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
- d. Edge Construction: Model 2, Seamless.
- e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
- f. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
- g. Core: Manufacturer's standard.

2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
- b. Construction: Full profile welded.

## 2.5 BORROWED LITES

- A. Fabricate of metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
- B. Construction: Full profile welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

## 2.6 FRAME ANCHORS

- A. Jamb Anchors:
  1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
  2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
  3. Post installed Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

## 2.7 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- B. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- C. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- D. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- E. Glazing: Comply with requirements in Section 088000 "Glazing."

## 2.8 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
  - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement,



mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- C. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
  2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
  3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
  4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
  5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

## 2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure. Provide primer suitable for metallic coated sheet so these doors can be painted.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

### 3.2 INSTALLATION

- A. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
  - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
  - 2. Fire-Rated Openings: Install frames according to NFPA 80.
  - 3. Floor Anchors: Secure with post installed expansion anchors.
  - 4. Solidly pack mineral-fiber insulation inside frames.
  - 5. In-Place Concrete or Masonry Construction: Secure frames in place with post installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  - 6. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- B. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
  - 1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

### 3.3 FIELD QUALITY CONTROL

- A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- C. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

### 3.4 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

- B. Metallic-Coated Surface: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

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## SECTION 081416 - FLUSH WOOD DOORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  1. Solid-core flush wood doors with plastic-laminate-faces.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:
  1. Door core materials and construction.
  2. Door edge construction
  3. Door face type and characteristics.
  4. Door trim for openings.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:
  1. Door schedule indicating door location, type, size, fire protection rating, and swing.
  2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
  3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
  4. Dimensions and locations of blocking for hardware attachment.
  5. Clearances and undercuts.
  6. Requirements for veneer matching.
  7. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples: For plastic-laminate door faces.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.
  1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
  2. Submit copy of DHI's Fire and Egress Door Assembly Inspector (FDAI) certificate.
- B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- B. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies shall comply with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
  - 1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.
- C. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies shall comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:
  - 1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.
  - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

2.2 SOLID-CORE FLUSH WOOD DOORS WITH PLASTIC-LAMINATE FACES

- A. Interior Doors -as indicated on the door schedule in the drawings:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ASSA ABLOY.

- b. Oshkosh Door Company.
- c. VT Industries Inc.
- 2. Performance Grade: ANSI/WDMA I.S. 1A Extra Heavy Duty.
- 3. Performance Grade:
  - a. ANSI/WDMA I.S. 1A Extra Heavy Duty.
- 4. Architectural Woodwork Standards Grade: Premium.
- 5. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
- 6. Colors, Patterns, and Finishes: As indicated on the drawings.
- 7. Exposed Vertical and Top Edges: Plastic laminate that matches faces, applied before faces.
  - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
  - b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
  - c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
    - 1) Screw-Holding Capability: 550 lbf (2440 N) in accordance with WDMA T.M. 10.
- 8. Core for Non-Fire-Rated Doors:
  - a. ANSI A208.1, Grade LD-1 particleboard.
    - 1) Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
    - 2) Provide doors with glued-wood-stave or WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices in Section 087100 "Door Hardware."
  - b. Glued wood stave.
  - c. WDMA I.S. 10 structural composite lumber.
    - 1) Screw Withdrawal, Face: 550 lbf (2440 N).
    - 2) Screw Withdrawal, Edge: 550 lbf (2440 N).
- 9. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
  - a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-

protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.

10. Construction: Five plies, hot-pressed or cold-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before faces and crossbands are applied.

### 2.3 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
  1. Wood Species: Species compatible with door faces.
  2. Profile: Manufacturer's standard shape.
- B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated on Drawings. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
- C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated on Drawings.

### 2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
  1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  2. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
  1. Locate hardware to comply with DHI-WDHS-3.
  2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
  3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
  4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
  5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Factory cut and trim openings through doors.
  1. Light Openings: Trim openings with moldings of material and profile indicated.



2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Install doors and frames to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Install frames level, plumb, true, and straight.
  1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3.2 mm in 2400 mm).
  2. Anchor frames to anchors or blocking built in or directly attached to substrates.
    - a. Secure with countersunk, concealed fasteners and blind nailing.
    - b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
      - 1) For factory-finished items, use filler matching finish of items being installed.
  3. Install fire-rated doors and frames in accordance with NFPA 80.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

#### 3.2 FIELD QUALITY CONTROL

- A. Inspection Agency: Owner will engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
  1. Provide inspection of installed Work through AWI's Quality Certification Program, certifying that wood doors and frames, including installation, comply with requirements of AWI/AWMCA/WI's "Architectural Woodwork Standards" for the specified grade.
  2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

### 3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

## SECTION 082200 – FRP (Fiberglass Reinforced Plastic) DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS AND SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division Four: Unit Masonry
- C. Division 8 Finish Hardware
- D. Division 8 Glass and Glazing

#### 1.2 SUMMARY

- A. Section includes:
  - 1. Fiberglass Reinforced Plastic (FRP) Doors
  - 2. Fiberglass Reinforced Plastic (FRP) Frames

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door type including door size, handing and finish.
  - 2. Cut out locations for lites and hardware
  - 3. Internal Reinforcement
  - 4. Frame Configuration and details, anchor types and spacing
  - 5. Construction and Color samples
  - 6. Details of doors including vertical and horizontal edge details.
- C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field quality control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
- B. Fire rated door, panel and frame construction conforms to products tested under ASTM E152, UL 10C and NFPA 252. Flame spread rating of 25 per ASTM E84 and shall be self-extinguishing per ASTM D635.
- C. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.
- D. Manufacturer Qualifications: A company that specializes in manufacturing FRP doors and frames with a minimum of 30 years' experience.
- E. Obtain all FRP doors and FRP frames from a single manufacturer to ensure consistent quality.
- F. Hardware and accessories for all FRP doors and frames shall adhere to Architects Hardware specification.
- G. Glass for windows shall be furnished per the Architect's instructions and specifications.
- H. Warranty: 10 years free from defects in material and workmanship from date of shipment and lifetime from corrosion from date of shipment provided doors and frames have not been misused, damaged or compromised.
- I. Delivery, Storage and Protection: Doors and frames shall be individually packaged , labeled and include fasteners and install instructions. Remove wet or damaged cartons. Deliver and store doors and frames at the job site in such a manner as to prevent damage and out of weather or extreme temperatures. Store in vertical position on blocking off of ground or floor surface. Remove all damaged or unsuitable doors and frames from job site.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Corrim Company.
  2. Edgewater Door.
  3. Tiger Door.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

### 2.3 INTERIOR AND EXTERIOR FRP DOORS AND FRAMES

- A. BASIS OF DESIGN MANUFACTURER:
1. Corrim Company or equivalent manufacturers subject to requirements and proof of equivalency through data submissions and approvals.
  2. Equivalent Products are acceptable provided they meet the same performance, warranty and aesthetic requirements as the basis of design product. Equivalent product and data must be submitted by apparent low bidder prior to contract execution for approval by Architect and Owner. Pre Bid approval by product manufacturers or contractors is not allowed. If contractor cannot prove equivalency of a product he will have to submit a product that will be approved.
  3. Substitutions are not acceptable. Substitutions are defined as products not equivalent to the Basis of Design Product.
- B. FRP Door Fabrication:
1. Doors:
    - a. Thickness: 1-3/4 inches (44.5 mm).
    - b. Lock styles on non-rated and rated active leaves shall be factory beveled 1/8" in 2".
    - c. Provide doors with completely seamless construction on all six surfaces.
  2. Face Sheets: FRP face sheets shall be manufactured using a corrosion resistant resin system with light stabilizing additives. The resin shall be reinforced with fiberglass, 50% average by weight for enhance strength. Face sheets shall be a

minimum of 0.125-inch-thick fiberglass. Face sheets will be Architects choose of smooth, pebble ore woodgrain seamless finish as selected from samples.

3. Stiles and Rails: Stiles and rails shall be 1 ½” square pultruded fiberglass tubes. Pultrusion is a fiberglass fabrication process that results in a much stronger, more durable product. Non-rated and 20-minute doors will have a full width horizontal 1 ½ inch square solid fiberglass block shall be used at all hardware reinforcements and corner intersections. A minimum of 1,000 pounds screw withdrawal force shall be required per screw. The bottom rail shall allow for 1 ¼ inch hgt. alterability without loss of the panel’s integrity. No metal or wood reinforcements are allowed.

C. Door Core

1. Unrated Doors:

- a. Polyurethane Foam Core: 1 ½” thick rigid block of insulation laminated to the interior of the panels. R factor of 12. Class A and cFC free. Foam properties to comply with ASTM E-84 and IBC.
- b. Thickness: 1-3/4 inches (44.5 mm).

2. Rated Doors 90 minute:

- a. Mineral Fiber Core rated to 90 minutes.

D. Hardware Preparation: Doors shall be reinforced and mortised for hardware with 1 ½” x 1 ½” of solid fiberglass to allow application of hinges and locks in accordance with the hardware schedule, hardware manufacturers instructions and templates.

1. Reinforcement Blocking:

- a. Non swelling polymer or firestop blocking will be used for all lockset, surface mounted hardware and thru bolted hardware blocking.

2. Pilot holes for full mortise butt hinges will be pre drilled by factor.

3. All hardware shall be attached and installed by using pilot hole and stainless steel wood screws.

E. Door Accessories:

1. Glazing: Glazing support structures shall ensure that the glass area is weather sealed as not to permit moisture from entering the core of the door. This is to be accomplished by utilizing pultruded 1 ½” square FRP tubes to fabricate the window opening. 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. Fasteners: Provide counter sunk stainless steel fasteners as required for glazing openings.
3. Astragals for pairs of doors to be fabricated with FRP material of manufacturers standard flat design.

## 2.4 FRP FRAMES

- A. Fabrication: FRP frames shall be rigid, neat in appearance, free from defects and the finish shall match the doors. Fabricated FRP doors and frames as shown on the drawings and in accordance with best shop practices. Field measurements shall be taken as required for coordinating with adjoining work.
1. Provide doors, frames, sidelites, transoms and borrowed lites as required.
  2. All frames shall be 100% pultruded fiberglass with an average 50% glass content by weight which results in an industrial fiberglass frame as strong as a 14 ga. hollow metal frame.
  3. Non rated and 20-minute UL labeled FRP Frames: Standard one pieced FRP profile with integral stop: 5 ¾" x 2" equal rabbet. Frames that must be grouted solid with mortar in the field to achieve label are not acceptable.
  4. 30-90-minute UL labeled FRP frames: Standard one piece FRP profile with integral stop: 5 ¾" x 2" equal rabbet. Frames that must be grouted solid with mortar in the field to achieve label are not acceptable.
  5. Head and Jamb members shall be one-piece frame, resin bonded and assembled at factory, available on non-rated frames only. Use standard knocked down frame for rated doors with 45 degree miter.
- B. Reinforcements and Braces/Supports
1. Frames shall be reinforced and mortised for hardware in accordance with hardware schedule, manufacturers instructions and templates. No metal allowed.
  2. Corner Reinforcement: 4" x 4" x 5 3/8" x ¼" thick pultruded fiberglass angle. Attached to head bard at factor using stainless steel screws.
  3. Mortise Hinge Reinforcement: 3" x 7" x 9/16" or 3/8" thick FRP maerial attached to frame by means of bonding and stainless steel counter sunk screws.
  4. Closer Reinforcement: 1 ½" x 19" x 3/16" thick FRP material attached to frame by means of bonding.
  5. Strike Reinforcement: 1 ½" x 9" x ¾" thick FRP material attached to frame by means of bonding and stainless-steel countersunk screws.
  6. Anchoring Systems: Furnish at least three anchors in each jamb of frames up to 90" high and one additional anchor for each 30" in height above 90" in shapes, sizes and spacing as shown or required for anchorage into adjoining wall construction.
    - a. Masonry: T-Strap or Wire Anchor- stainless steel.
    - b. Stud Wall: Stud anchor before sheathing applied.

2.5 FINISH

- A. Polyurethane finish, high solids polyurethane topcoat which exhibits excellent chemical resistance, outstanding toughness, flexibility, abrasion resistance and excellent outside durability.
  - 1. Matte: all face sheet options:
  - 2. Finish on Door and Frames units will match. Color to be selected from manufacturers standard colors by Architect.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Installer shall examine the substrate and conditions under which fiberglass reinforced plastic work is to be installed and notify the General Contractor in writing of any 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.

3.2 INSTALLATION:

- A. Doors and Frames shall be delivered in containers individually marked and identified.
- B. Installation in accord with manufacturers printed instructions, shop drawings, and details of doors, including vertical- and horizontal-edge details, NFPA 80 standards for fire rated openings and FBC labeled openings.
- C. Provide door clearances of: 1/8" at jambs and heads and 1/4" clearance above thresholds.
- D. Fire rated doors and frames must be installed by qualified licensed installers adhering to latest version of NFPA 80.

3.3 ADJUSTING:

- A. At substantial completion adjust all operable components to ensure proper installation. Doors shall function smoothly and swing freely without binding. Doors shall remain open at any angle without being affected by gravitational influence.
  - 1. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, Section 7.2.1.15.
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.



- C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 CLEANING:

- A. Remove dirt and excess sealant from exposed surfaces. Follow the manufacturers recommend cleaning techniques and procedures for cleaning all surfaces. Only use cleaning products that will not scratch or damage the surfaces and are recommended by the manufacturer.

END OF SECTION 082200

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**SECTION 083100 - ACCESS DOORS AND PANELS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Floor mounted access door and frame units, interior and exterior.

**1.2 REFERENCE STANDARDS**

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

**1.3 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Manufacturer's Installation Instructions: Indicate installation requirements.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.
- F. Project Record Documents: Record actual locations of each access unit.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

**PART 2 PRODUCTS****2.1 ACCESS DOORS AND PANELS ASSEMBLIES**

- A. Interior Floor-Mounted Access Units:
  - 1. Location: As indicated on drawings.
  - 2. Size: 36 by 36 inches (915 by 915 mm) or as otherwise indicated on Construction Drawings.
- B. Exterior Floor-Mounted Access Units:
  - 1. Location: As indicated on drawings.
  - 2. Size: 36 by 36 inches (915 by 915 mm) or as otherwise indicated on Construction Drawings.

**2.2 FLOOR MOUNTED ACCESS UNITS**

- A. Manufacturers:
  - 1. ACUDOR Products Inc; ACUDOR FC-300: [www.acudor.com](http://www.acudor.com)
  - 2. Babcock-Davis: [www.babcockdavis.com](http://www.babcockdavis.com)
  - 3. BILCO Company; Type J - Channel Frame, steel: [www.bilco.com](http://www.bilco.com)
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Floor Mounted Access Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
  - 1. Size: As indicated on drawings.
  - 2. Hardware: Steel, hot-dipped galvanized, or 316 Stainless Steel.
    - a. Hinges: Removable pin.

- b. Lock: Integral locking mechanism.
- C. Interior Floor Mounted Access Units: Aluminum, minimum 1/4 inch (6 mm) thick.
  - 1. Design Load: Design to support live load of 300 pounds per square foot (14 kPa) with deflection not to exceed 1/180 of span.
  - 2. Operation: Manual opening, and manual closing.
  - 3. Cover Pattern: Diamond tread plate.
  - 4. Lift Handle: Recessed, non-removable.
  - 5. Finish: Mill finish.
- D. Exterior Floor Mounted Access Units: Aluminum, minimum 1/4 inch (6.4 mm) thick.
  - 1. Design Load: Design to support live load of 300 lb/sq ft (14 kPa) with deflection not to exceed 1/180 of span.
  - 2. Operation: Manual opening, and manual closing.
  - 3. Frame Configuration: Drainage channel with drain coupling.
  - 4. Cover Pattern: Diamond tread plate, with custom lettering.
  - 5. Lift Handle: Recessed, non-removable.
  - 6. Finish: Mill finish.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

#### 3.3 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

## SECTION 083323 - OVERHEAD COILING DOORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Service doors.
2. Insulated service doors.
3. Fire-rated service doors.
4. Fire-rated, insulated service doors.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports, door-opening framing, corner guards, and bollards.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
2. Show locations of controls, locking devices detectors or replaceable fusible links, and other accessories.

C. Samples: For each exposed product and for each color and texture specified.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

A. Special warranty.

B. Maintenance data.

C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".
- B. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
  - 1. Design Wind Load: As indicated on Structural Drawings.
- C. Windborne-Debris Impact Resistance: Provide impact-protective overhead coiling doors that pass ASTM E1886 missile-impact and cyclic-pressure tests according to ASTM E1996 for Wind Zone 1 for enhanced protection.
  - 1. Large-Missile Test: For overhead coiling doors located within 30 feet (9.1 m) of grade.

Retain "Seismic Performance" Paragraph below if required for Project. Nonstructural architectural components in Seismic Design Category A are exempt from seismic design requirements; and in Seismic Design Category B, nonstructural architectural components are generally exempt if the Component Importance Factor is 1.0. Coordinate requirements with Project's structural engineer.

- D. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. See structural drawings for classification.

2.2 DOOR ASSEMBLY

- A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Cornell Cookson.
  - b. Overhead Door.
- B. Operation Cycles: Door components and operators capable of operating for not less than 100,000.
- C. Curtain R-Value: 5.0 deg F x h x sq. ft./Btu (0.881 K x sq. m/W).
- D. Door Curtain Material: Stainless steel.
- E. Door Curtain Slats: Flat profile slats of 1-7/8-inch (48-mm) center-to-center height.
  1. Manufacturers standard insulated slat profile.
- F. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm) thick; fabricated from stainless steel and finished.
- G. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats.
- H. Hood: Stainless steel.
  1. Mounting: Face of wall as indicated on Drawings.
- I. Locking Devices: Equip door with locking device assembly and chain lock keeper.
  1. Locking Device Assembly: locking bars, operable from inside with thumbturn outside with cylinder. See also hardware schedule in specification manual.
- J. Manual Door Operator: Chain-hoist operator.
- K. Curtain Accessories: Equip door with weather seals.
- L. Door Finish:
  1. Stainless Steel Finish: ASTM A480/A480M No. 2B (bright, cold rolled).
  2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

### 2.3 MATERIALS, GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### 2.4 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical

properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84 or UL 723. Enclose insulation completely within slat faces.

- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

## 2.5 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.

## 2.6 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: As specified in Section 087100 "Door Hardware".

Retain "Keys" Subparagraph below if cylinders are provided by door manufacturer.

2. Keys: Three for each cylinder.

- B. Chain Lock Keeper: Suitable for padlock.

- C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

## 2.7 CURTAIN ACCESSORIES

- A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.



- B. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.

## 2.8 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

## 2.9 MANUAL DOOR OPERATORS

- A. General: Equip door with manual door operator by door manufacturer.
- B. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25-lbf (111-N) force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

### 3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  1. Test door release, closing and locking mechanism. Test manual operation of closed door.
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

## SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Aluminum-framed storefront systems.
2. Aluminum-framed entrance door systems.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
2. Include point-to-point wiring diagrams.

- C. Samples: For each type of exposed finish required.

- D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

- E. Delegated-Design Submittal: For aluminum-framed entrances and storefronts, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.

- B. Product test reports.

- C. Source quality-control reports.

- D. Field quality-control reports.

- E. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated and acceptable to Owner and Architect.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked-enamel, powder-coat, or organic finishes within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
  - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
- E. Structural: Test according to ASTM E330/E330M as follows:
  - 1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

- F. Water Penetration under Static Pressure: Test according to ASTM E331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft. (480 Pa).
  
- G. Energy Performance: Certified and labeled by manufacturer for energy performance as follows: Climate Zone 3
  - 1. Thermal Transmittance (U-factor):
    - a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) as determined according to NFRC 100.
    - b. Entrance Doors: U-factor of not more than 0.77 Btu/sq. ft. x h x deg F (4.37 W/sq. m x K) as determined according to NFRC 100.
  - 2. Solar Heat-Gain Coefficient (SHGC):
    - a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.26 as determined according to NFRC 200.
    - b. Entrance Doors: SHGC of not more than 0.25 as determined according to NFRC 200.
  - 3. Air Leakage:
    - a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa) when tested according to ASTM E283.
    - b. Entrance Doors: Air leakage of not more than 1.0 cfm/sq. ft. (5.08 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
  - 4. Condensation Resistance Factor (CRF):
    - a. Fixed Glazing and Framing Areas: CRF for the system of not less than 70 as determined according to AAMA 1503.
    - b. Entrance Doors: CRF of not less than 68 as determined according to AAMA 1503.
  
- H. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 for enhanced protection.
  - 1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
  
- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 2.2 STOREFRONT SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Kawneer North America, an Arconic company.
  2. YKK AP America Inc.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Exterior Framing Construction: Thermally broken or Thermally improved.
  2. Interior Framing Construction: Nonthermal.
  3. Glazing System: Retained mechanically with gaskets on four sides.
  4. Finish: Color anodic finish or High-performance organic finish that is acid resistant and same finish applied inside and out - as approved by Architect. See drawings for more information.
  5. Fabrication Method: Field-fabricated stick system.
  6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  7. Steel Reinforcement: As required by manufacturer.
- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

## 2.3 ENTRANCE DOOR SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Kawneer North America, an Arconic company.
  2. YKK AP America Inc.
- B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.
1. Door Construction: 2-inch (50.8-mm) overall thickness, with minimum 0.188-inch- (4.8-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
  2. Door Design: As indicated.
  3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

## 2.4 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."
- B. General: Provide entrance door hardware and for each entrance door, to comply with requirements in this Section.
  - 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
  - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
  - 3. Opening-Force Requirements:
    - a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
    - b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.
- C. Designations: Requirements for design, grade, function, finish, quantity, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
  - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
  - 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
  - 3. BHMA A156.5, Grade 1.
- D. Weather Stripping: Manufacturer's standard replaceable components.
  - 1. Compression Type: Made of ASTM D2000 molded neoprene or ASTM D2287 molded PVC.
  - 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- E. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- F. Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (12.7 mm).

## 2.5 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."



- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

## 2.6 MATERIALS

- A. Sheet and Plate: ASTM B209 (ASTM B209M).
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).
- C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
- D. Structural Profiles: ASTM B308/B308M.
- E. Steel Reinforcement:
  - 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
  - 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
  - 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- F. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

## 2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from exterior.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.8 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker. See drawings for basis of design YKK product.
  - 1. Color: Dark bronze Match - Architect's sample.
  - 2. Finish for both inside and outside.
- B. Alternate Interior Finish: Superior-Performance Organic Finish, Four-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
  - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
  - 2. Color and Gloss: Match Architect's sample.
  - 3. A three coat fluoropolymer can be used on the outside face.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.
- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Seal perimeter and other joints watertight unless otherwise indicated.
- G. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.
- I. Install joint filler behind sealant as recommended by sealant manufacturer.
- J. Install components plumb and true in alignment with established lines and grades.

### 3.2 INSTALLATION OF GLAZING

- A. Install glazing as specified in Section 088000 "Glazing."

### 3.3 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

- A. Install entrance doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
  2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections noted below as Owners responsibility to be paid under the inspections and testing allowance of Section 012100, Allowances.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
    - a. Perform a minimum of three tests in areas as directed by Architect.
  2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. (0.45 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
    - a. Perform a minimum of two tests in areas as directed by Architect.

- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 084113

## SECTION 085119 - STAINLESS STEEL WINDOWS- Interior Fire Rated

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Cold-rolled stainless-steel windows for interior application

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For cold-rolled stainless-steel windows.

C. Samples: For each exposed product and for each finish specified, 12 inches (300 mm) long.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Qualification data.

B. Product test reports.

C. Sample warranties.

#### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

#### 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating cold-rolled stainless steel windows that meets performance requirements indicated and of documenting performance by labels, test reports, and calculations.

#### 1.6 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of cold-rolled stainless-steel windows that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 4 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Optimum Window Mfg Corp.
  2. Thermally Broken Steel USA.

### 2.2 PERFORMANCE REQUIREMENTS

- A. SWI Standards: Comply with applicable requirements in SWI's "The Architect's Guide to Steel Windows and Doors" and "Specifications: Cold-Rolled," except where more stringent requirements are indicated.
- B. Fire-Test-Response Characteristics: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.
- C. Rating required: 2 hr.

### 2.3 COLD-ROLLED STAINLESS STEEL WINDOWS

- A. Types: Provide the following operating types in locations indicated on Drawings:
1. Fixed.
- B. Cold-Rolled Steel Windows: Provide frame and sash members mechanically formed from cold-rolled, ASTM A240/A240M, austenitic stainless-steel sheet, Type 304 or Type 316. Comply with SWI specifications for combined weight of frame and sash members and front-to-back depth of frame or sash members.
- C. Window Finish: Directional Satin Finish or No. 4 Dull Satin Finish: No. 6.
- D. Mullions: Formed of cold-rolled stainless-steel matching window units; with anchors for support to structure and for installation of window units and having sufficient strength to withstand design pressure indicated. Provide mullions of profile indicated and with cover plates. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections.
- E. Glazing Stops: Provide screw-applied or snap-on glazing stops; coordinate with Section 088000 "Glazing" and with glazing system indicated. Provide glazing stops to match panel frames. Finish glazing stops to match window units if fabricated of steel; otherwise, provide manufacturer's standard finish.
- F. Weather Stripping: Manufacturer's standard compressible weather stripping, complying with AAMA 701/702, ASTM C509, or ASTM C864 and designed for permanently resilient sealing under compression and for complete concealment when sash is closed.

## 2.4 GLAZING

- A. Clear Glass and Glazing System: See Section 088813 " Fire Rated Glazing" for glass units and glazing requirements for cold-rolled stainless steel windows.

## 2.5 ACCESSORIES

- A. Fasteners: Provide fasteners of stainless steel that are warranted by manufacturer to be noncorrosive and compatible with trim, hardware, anchors, and other components of cold-rolled stainless steel windows.
- B. Anchors, Clips, and Window Accessories: Provide units of stainless steel complying with ASTM A123/A123M. Provide units with sufficient strength to withstand design pressure indicated.

## 2.6 FABRICATION

- A. Fabricate cold-rolled stainless steel windows of type and in sizes indicated to comply with SWI standards. Include a complete system for assembly of components and anchorage of window units.
- B. Factory Glazed
- C. Subframes and Operable Sash: Formed of cold-rolled stainless steel of profile indicated. Manufacturer's standard for required fire rating.
- D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated. Fire rated type required.

## 2.7 STAINLESS STEEL SHEET FINISHES

- A. Stainless steel Finishes: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. SWI Publication: Comply with applicable requirements in SWI's "General Guidelines on the Installation of Steel Windows," except where more stringent requirements are indicated.
- B. Comply with manufacturer's written instructions for installing windows, hardware, operators, accessories, and other components.

- C. Install windows level, plumb, square, true to line, without distortion or impediment to thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

### 3.2 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

END OF SECTION 085119



## SECTION 085413 - FIBERGLASS WINDOWS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes fiberglass-framed windows.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

#### 1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace fiberglass windows that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period:
    - a. Window: 10 years from date of Substantial Completion.
    - b. Glazing Units: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
  - 1. Window Certification: WDMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
  - 1. Minimum Performance Class: CW.
  - 2. Minimum Performance Grade: 30.
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.35 Btu/sq. ft. x h x deg F (2.0 W/sq. m x K).
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.30.
- E. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 for basic protection.
  - 1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.

### 2.2 FIBERGLASS WINDOWS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Alpen High Performance Products.
  - 2. Corrim Company.
  - 3. Fibertec Window and Door Manufacturing.
- B. Frames and Sashes: Pultruded fiberglass complying with AAMA/WDMA/CSA 101/I.S.2/A440 and with exposed exterior fiberglass surfaces finished with manufacturer's standard enamel coating complying with AAMA 623.
  - 1. Exterior Color: As selected by Architect from manufacturer's full range.
  - 2. Interior Finish: Matching exterior color and finish.
- C. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3.
  - 1. Kind: Fully tempered where indicated on Drawings.
- D. Insulating-Glass Units: ASTM E2190.
  - 1. Glass: ASTM C1036, Type 1, Class 1, q3.

- a. See drawings for glass types and basis of design manufacturer.
- E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- F. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- G. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
  - 1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

## 2.3 FABRICATION

- A. Fabricate fiberglass windows in sizes indicated. Include a complete system for installing and anchoring windows.
- B. Glaze fiberglass windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Mullions: Provide mullions and cover plates, 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. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.

- D. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085413

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:
  - a. Swinging doors.
2. Cylinders for locks specified in other Sections.

B. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1. Coiling Door and Shutter Lock Cylinders to be installed under other Sections.
2. Permanent lock cores to be installed by Owner.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and texture specified.

C. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
  - b. Content: Include the following information:
    - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
    - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
    - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.

Description of electrified door hardware sequences of operation and interfaces with other building control systems.

2. Keying Schedule: Prepared by or under the supervision of hardware supplier or manufacturer, detailing Owner's final keying instructions for locks.

### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
  1. For door hardware, an Architectural Hardware Consultant (AHC).
- C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with Georgia Accessibility Code.
  1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
  2. Comply with the following maximum opening-force requirements:
    - a. Interior, Non-Fire-Rated Hinged Doors: (5 lbf.) Applied perpendicular to door.
    - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
  3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than ½ inch high.
  4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- E. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination."

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Three (3) years from date of Substantial Completion, unless otherwise indicated.
    - a. Locks: Limited Lifetime Warranty from date of Substantial Completion.
    - b. Manual Closers: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Articles to comply with requirements in this Section.
  - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2.2 BUTT HINGES

- A. Butt Hinges: Provide 4 ½ inch by ½ inch size non-removable pins for outswing exterior doors unless otherwise specified. Provide non-rising pins elsewhere. Provide number of hinges indicated but not less than three hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
  - 2. Acceptable Manufacturers:

- a. Bommer
- b. Stanley
- c. McKinney
- d. Hager Hinge

2.3 CONTINUOUS HINGES

- A. Continuous Hinges: BHMA A156.26; Fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.
- B. Continuous, Gear-Type Hinges: Extruded-aluminum, pin-less, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. Bommer Industries, Inc.
    - b. Select Products Limited.
    - c. Stanley Commercial Hardware; Div. of the Stanley Works.
    - d. Hager Companies
    - e. Zero International.

2.4 MECHANICAL LOCKS AND LATCHES

- A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
  - 1. Curved Lip Strikes: For locks with antifriction latchbolts, as recommended by manufacturer.
  - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
- B. Mortise Locks: BHMA A156.13; Operational Grade 1 Security Grade 2; stamped steel case with steel or brass parts; Series 1000.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
      - 1) 45H Series (14M Basis of Design)
    - b. Schlage Lock; An Allegion Company
      - 1) L9000 Series
    - c. Sargent Lock; Div. of Assa Abloy
      - 1) 8200 Series



2.5 LOCK CYLINDERS

- A. Lock Cylinders: - "7 Pin SFIC constructed from brass or bronze.
  - 1. Manufacturer: Same manufacturer as for locking devices.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 3. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
      - 1) Permanent Cores CORMAX (Basis of Design)
    - b. Schlage Lock; An Allegion Company
      - 1) Permanent Cores Everest 29
    - c. Sargent Lock; Div. of Assa Abloy
      - 1) Permanent Cores Degree
- B. Construction Master Keys: Provide 10 construction master keys and 2 control keys.
- C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys and 2 control keys.

2.6 KEYING

- A. Keying System: Factory registered complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
  - 1. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
    - a. Master key or grand master key locks to Patented 7 SFIC System.
- B. Keys: Nickel silver.
  - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
    - a. Notation: **"DO NOT DUPLICATE"**.
  - 2. Quantity: Provide the following:
    - a. Cylinder Core Change Keys: Three.
    - b. Master Keys: Six.
    - c. Grand Master Keys: Six.
    - d. Control Keys Two Permanent and Construction.

2.7 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. Burns Manufacturing Incorporated.
    - b. Don-Jo Mfg., Inc.
    - c. Hiawatha, Inc.
    - d. Rockwood Manufacturing Company.
    - e. Trimco.

2.8 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide multi-sized closers, adjustable to meet field conditions and requirements for opening force.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. LCN Closers; an Allegion company.
      - 1) 4040XP Series
    - b. Norton Door Controls; an ASSA ABLOY Group company.
      - 1) 7500 Series
    - c. Yale Security; an ASSA ABLOY Group company
      - 1) 4400 Series
    - d. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
      - 1) 3500 Series
    - e. Stanley Security Solutions; Div. of The Stanley Black & Decker Corp. company.
      - 1) D4550 Series

2.9 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16; cast brass, bronze, or stainless steel base metal.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

- a. Architectural Builders Hardware Mfg., Inc.
- b. Baldwin Hardware Corporation.
- c. Burns Manufacturing Incorporated.
- d. Don-Jo Mfg., Inc.
- e. Hiawatha, Inc.
- f. Rockwood Manufacturing Company.
- g. Trimco.

2.10 SURFACE MOUNTED OVERHEAD STOPS

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
  - a. ABH
  - b. Glynn Johnson
  - c. Rixson

2.11 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; fabricated to full height and width of opening indicated.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. National Guard Products.
    - b. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
    - c. Reese Enterprises, Inc.
    - d. Zero International.

2.12 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. National Guard Products.
    - b. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
    - c. Reese Enterprises, Inc.
    - d. Zero International.

2.13 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. Baldwin Hardware Corporation.
    - b. Burns Manufacturing Incorporated.
    - c. Don-Jo Mfg., Inc.
    - d. Hiawatha, Inc.
    - e. Rockwood Manufacturing Company.
    - f. Trimco.

2.14 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
    - a. Baldwin Hardware Corporation.
    - b. Don-Jo Mfg., Inc.
    - c. Rockwood Manufacturing Company.
    - d. Trimco.
    - e. Burns Manufacturing Incorporated.

2.15 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
  - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  - 2. Fire-Rated Applications:

- a. Steel Through Bolts: For the following unless door blocking is provided:
  - 1) Surface mounted overhead stops.
  - 2) Closers to doors and frames.
- 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
- 4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

## 2.16 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
- C. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  - 2. Custom Steel Doors and Frames: HMMA 831.
  - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

- E. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- F. Lock Cylinders: Install construction cores to secure building and areas during construction period.
  - 1. Furnish permanent cores to Owner for installation.
- G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07920 "Joint Sealants."
- H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- L. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### 3.2 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

### 3.3 DOOR HARDWARE SCHEDULE

HW-AL-1 MAIN ENTRY -

DOOR: 106

EACH TO HAVE:

2	CONT. HINGES	FM SLI/SLF HD (EPT)	628	BOM
2	POWER TRANSFERS	PT1000	US28	ABH
1	EXIT DEVICE	2800-C03 CD MLR TS	630	PREC
1	EXIT DEVICE	2800-01 CD TS	630	PREC
2	MORTISE CYLINDER	1E74	626	BEST
1	RIM CYLINDER	1E72	626	BEST
3	PERM. CORE	1C7 MATCH EXISTING SYSTEM	626	BEST
2	PULLS	1194-3 MT. N	630	TRI
2	CLOSERS	4040XP-4040-18G	689	LCN
2	OH STOPS	1000N	630	ABH
1	SET WEATHERSEAL	BY DOOR/FRAME MFG.		
1	DOOR BOTTOM	BY DOOR/FRAME MFG.		
1	THRESHOLD	BY DOOR/FRAME MFG.		
2	DOOR PISTION SWITCH	MC-4	B	SDC
1	CREDENTIAL READER	BY SECURITY/ACCESS CONTROL		
	POWER SUPPLY	BY SECURITY/ACCESS CONTROL		

HW-AL-2 PORCH ENTRY

DOOR: 201

EACH TO HAVE:

1	CONT. HINGES	SL18HD/SL11HD AS REQUIRED (EPT)		C
	SEL			
1	POWER TRANSFER	PT1000	US28	ABH
1	EXIT DEVICE	2100-C03 CD MLR TS	630	PREC
1	MORTISE CYLINDER	1E74 X CONST. CORE	626	BEST
1	RIM CYLINDER	1E72 X CONST. CORE	626	BEST
2	PERM. CORES	1C7 CORMAX	626	BEST
1	PULLS	1194-3 MT. N	630	TRI
1	CLOSERS	4040XP-4040-18G	689	LCN
1	OH STOP	1000N	630	ABH
1	SET WEATHERSEAL	BY DOOR MFG.		
1	DOOR BOTTOM	BY DOOR MFG.		
1	THRESHOLD	BY DOOR MFG.		
1	DOOR PISTION SWITCH	MC-4	B	SDC
1	CREDENTIAL READER	BY SECURITY/ACCESS CONTROL		
	POWER SUPPLY	BY SECURITY/ACCESS CONTROL		

HW-AL-3 OPS ROOM

DOOR: 211,  
EACH TO HAVE:

3	HINGES	BB5002 450	630	BOM
1	OFFICE LOCK	45H7A 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	CLOSER	4040XP-REG ARM	689	LCN
1	WALL STOP	1270W	630	TRI

HW-1 ELECTRICAL ROOM SINGLE

DOOR: 101, 102  
EACH TO HAVE:

1	CONT. HINGES	SL300	630	SEL
1	EXIT DEVICE	2103-1703A	630	PREC
1	RIM CYLINDERS	1E72	626	BEST
1	PERM. CORE	1C7 MATCH EXISTING SYSTEM	626	BEST
1	CLOSERS	4040XP-EDA	689	LCN
1	WALL STOP	1270W	630	TRI
1	SET SEAL	5050	B	NGP

HW-2 OH GRILL // OH DOOR

DOOR: 103, 108, 115, 116, 117, 118, 119, 120,  
EACH TO HAVE:

ALL HARDWARE BY DOOR MFG.

1	CYLINDER	1E72 OR 1E74 X CONST CORE	626	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST



HW-3 EXTERIOR ELECTRICAL ROOM

DOOR: 104

EACH TO HAVE:

1	CONT. HINGES	SL300	630	SEL
1	EXIT DEVICE	2103-1703A	630	PREC
1	RIM CYLINDERS	1E72 X CONST. CORE	626	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	CLOSER	4040XP-S-CUSH	689	LCN
1	SET SEALS	700SA		NGP
1	DOOR BOTTOM	95WH		NGP
1	THRESHOLD	896S ¼"-20 MS/EA		NGP
1	DRIPC CAP	16A		NGP

HW-4 UNISEX LAV. LOCKER ROOM

DOOR: 105, 202, 205,

EACH TO HAVE:

3	HINGES	BB5002 450	630	BOM
1	PRIVACY SET	45HOL 14M VIT (VISUAL INDICATOR)		630
	BEST			
1	CLOSER	4040XP- REG ARM (EDA @ OUTSWING)	689	LCN
1	KICK PLATE	8 X 2 LDW .050 B4E CS	630	TRI
1	WALL STOP	1270W	630	TRI
1	SET SEALS	5050	B	NGP

HW-5 EXTERIOR

DOOR: 107, 114, 121,

EACH TO HAVE:

1	CONT. HINGE	SL300	630	SEL
1	EXIT DEVICE	2103 X 1703A	630	PREC
1	RIM CYLINDER	1E72 X CONST CORE	626	BEST
1	PERM. CORE	1C7 X CORMAX	626	BEST
1	ELECTRIC STRIKE	9600 LBM	630	HES
1	CLOSER	4040XP S-H-CUSH (SRI)	689	LCN
1	KICK PLATE	8 X 2 LDW .050 B4E CS	630	TRI
1	SET SEALS	700S	A	NGP
1	DOOR BOTTOM	95WH		NGP
1	THRESHOLD	896HDS ¼-20 MS/ EA		NGP

1	RAIN DRIP	16	A	NGP
1	DOOR PISTION SWITCH	MC-4	B	SDC
1	CREDENTIAL READER	BY SECURITY/ACCESS CONTROL		
1	REQUEST TO EXIT SENSOR	BY SECURITY/ACCESS CONTROL		
	POWER SUPPLY	BY SECURITY/ACCESS CONTROL		

HW-6 BLOWER ROOM PAIR

DOOR: 109,  
EACH TO HAVE:

2	CONT. HINGES	SL300	630	SEL
2	FLUSH BOLTS	3917 24" / 12"	630	TRI
1	STOREROOM LOCK	45H7D 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
2	CLOSERS	4040XP-HEDA (SRI)	689	LCN
1	ASTRAGAL	551/553 SS AS REQUIRED	630	NGP
		OMIT IF PROVIDED BY DOOR MFG.		
2	WALL STOPS	1270W	630	TRI
1	SET SEALS	700S	A	NGP
1	PC SEAL	5060 @ ASTRAGAL		NGP
2	DOOR BOTTOMS	OV634	A	NGP
1	THRESHOLD	413 ¼-20 MS/EA		NGP

HW-7 COMPRESSOR

DOOR: 110  
EACH TO HAVE:

1	CONT. HINGES	SL300	630	SEL
1	STOREROOM LOCK	45H7D 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	CLOSER	4040XP-S-CUSH (SRI)	689	LCN
1	SET SEALS	700S	A	NGP
1	DOOR BOTTOM	OV634	A	NGP
1	THRESHOLD	413 ¼-20 MS/EA		NGP

HW-8 WORK ROOM / STAIR

DOOR: 111, 214  
EACH TO HAVE:

1	CONT. HINGES	SL300	630	SEL
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1	STOREROOM LOCK	45H7AB 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	CLOSER	4040XP-S-CUSH (SRI)	689	LCN
1	KICK PLATE	8 X 2 LDW .050 B4E CS	630	TRI
1	SET SEALS	700S	A	NGP
1	DOOR BOTTOM	OV634	A	NGP
1	THRESHOLD	413 ¼-20 MS/EA		NGP

HW-9

FLUORINE ROOM / ROOM EXTERIOR PAIRS

DOOR: 112, 113,  
EACH TO HAVE:

2	CONT. HINGES	SL300	630	SEL
2	FLUSH BOLTS	3917 24' / 12"	630	TRI
1	STOREROOM LOCK	45H7TD 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
2	CLOSERS	4040XP-S-H- CUSH (SRI)	689	LCN
1	ASTRAGAL	551/553 SS AS REQUIRED	630	NGP
		OMIT IF PROVIDED BY DOOR MFG.		
1	SET SEALS	700S	A	NGP
2	DOOR BOTTOMS	95WH		NGP
1	THRESHOLD	896HDS ¼-20 MS/EA		NGP
1	DRIP CAP	16	A	NGP

HW-10

LOBBY

DOOR: 203  
EACH TO HAVE:

3	HINGES	BB5002 450 N	630	BOM
1	STOREROOM LOCK	45H7AB 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	CLOSER	4040XP-HEDA	689	LCN
1	KICK PLATE	8 X 2 LDW .050 B4E CS	630	TRI
1	WALL STOP	1270W	689	LCN
1	SET SEALS	5050		NGP

HW-11

JANITOR

DOOR: 204  
EACH TO HAVE:

3	HINGES	BB5002 450 N	630	BOM
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1	STOREROOM LOCK	45H7AB 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	OH STOP	9000H	630	ABH
1	KICK PLATE	8 X 2 LDW .050 B4E CS	630	TRI
3	SILENCERS	1229A	GRAY	TRI

HW-12 CONFERENCE/OFFICE/CLOSET

DOORS: 206, 208, 210, 213, 215,  
EACH TO HAVE:

3	HINGES	BB5002 450	630	BOM
1	OFFICE LOCK	45H7A 14M X CONST. CORE (457D @ 215)	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	WALL STOP	1270W	630	TRI
3	SILENCERS	1229A	GRAY	TRI

HW-13 BREAKROOM

DOOR: 207,  
EACH TO HAVE:

3	HINGES	BB5002 450	630	BOM
1	CLASSROOM LOCK	45H7R 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	CLOSER	4040XP- REG ARM	689	LCN
1	KICK PLATE	8 X 2 LDW .050 B4E CS	630	TRI
1	WALL STOP	1270W	689	LCN
1	SET SEALS	5050		NGP

HW-14 VAULT

DOOR: 209  
EACH TO HAVE:

3	HINGES	BB5002 450	630	BOM
1	STOREROOM LOCK	45H7D 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	CLOSER	4040XP- REG ARM	689	LCN
1	KICK PLATE	8 X 2 LDW .050 B4E CS	630	TRI
1	WALL STOP	1270W	689	LCN
1	SET SEALS	5050		NGP

HW-15 LAB

DOORS: 212  
EACH TO HAVE:

3	HINGES	BB5002 450 NRP	630	BOM
1	CLASSROOM LOCK	45H7R 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	CLOSER	4040XP- S-H-CUSH	689	LCN
1	KICK PLATE	8 X 2 LDW .050 B4E CS	630	TRI
1	SET SEALS	5050		NGP
1	DOOR BOTTOM	OV634	A	NGP

HW-16 TRASH ENCLOSURE

DOORS: D1  
EACH TO HAVE:

1	CONT. HINGE	SL300	630	SEL
1	STOREROOM LOCK	45H7TD 14M X CONST. CORE	630	BEST
1	PERM. CORE	1C7 CORMAX	626	BEST
1	OH STOP	9000H	630	ABH
3	SILENCERS	1229A	GRAY	TRI
1	DOOR BOTTOM	OV633	A	NGP
1	THRESHOLD	896HDS ¼-20 MS/EA		NGP
1	DRIP CAP	16	A	NGP

MANUFACTURER ABBREVIATIONS:

BEST	BEST ACCESS
LCN	LCN CLOSERS
NGP	NATIONAL GUARD PRODUCTS
BOM	BOMMER
TRI	TRIMCO
ABH	ARCHITECTURAL BUILDERS HARDWARE
PREC	PRECISION
SEL	SELECT

END OF SECTION 08 7100

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## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Glass for windows doors interior borrowed lites storefront framing.
2. Glazing sealants and accessories.

#### 1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.

#### 1.5 QUALITY ASSURANCE

- A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

#### 1.6 PRECONSTRUCTION TESTING

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

## 1.7 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. AGC Glass Company North America, Inc.
  2. Guardian Glass; SunGuard.
  3. Pilkington North America.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.



- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E1300.
  - 1. Design Wind Pressures: As indicated on Drawings.
  - 2. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Windborne-Debris Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 for basic protection.
  - 1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  - 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
  - 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  - 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

### 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
  - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
- B. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.
- C. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- D. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- E. Reflective-Coated Vision Glass: ASTM C1376.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Guardian Glass; SunGuard.
    - b. Pilkington North America.

## 2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.
  - 1. Sealing System: Dual seals.
  - 2. Perimeter Spacer: Manufacturer's standard spacer material and construction Stainless steel.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) Technoform.
      - 2) Thermix; a brand of Ensinger USA.

## 2.6 GLAZING SEALANTS

### A. General:

1. **Compatibility:** Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. **Suitability:** Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. **Colors of Exposed Glazing Sealants:** As indicated by manufacturer's designations.

### B. Glazing Sealant:

1. Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
  - a. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - 1) GE Construction Sealants; Momentive Performance Materials Inc.
    - 2) Pecora Corporation.
    - 3) The Dow Chemical Company.
2. Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT.
  - a. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - 1) GE Construction Sealants; Momentive Performance Materials Inc.
    - 2) Pecora Corporation.
    - 3) The Dow Chemical Company.

## 2.7 GLAZING TAPES

- ### A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

## 2.8 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks:
  - 1. Type recommended by sealant or glass manufacturer.
- C. Spacers:
  - 1. Type recommended by sealant or glass manufacturer.
- D. Edge Blocks:
  - 1. Type recommended by sealant or glass manufacturer.
- E. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## PART 3 - EXECUTION

### 3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

### 3.2 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- F. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### 3.4 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.

- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

### 3.5 INSULATING GLASS SCHEDULE

- A. Glass Types : See schedule and notes on drawings.
  - 1. Basis-of-Design Product: Guardian – see schedule on drawings.
  - 2. Overall Unit Thickness: 1 inch (25 mm).
  - 3. Safety glazing required see drawings for location.

END OF SECTION 088000

## SECTION 088813 - FIRE-RATED GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  1. Fire-protection-rated glazing.
  2. Fire-resistance-rated glazing.

#### 1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

#### 1.4 WARRANTY

- A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
  1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Double Glazing Units with Clear Gel Fill: Manufacturer agrees to replace units that deteriorate within specified warranty period. Deterioration of double glazing units with clear gel fill is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning glass contrary to manufacturer's written instructions. Evidence of failure is the leakage of gel fill from units, air bubbles within units, or obstruction of vision by contamination or deterioration of gel.

1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization 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. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
- B. Safety Glazing Labeling: Permanently mark glazing with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

### 2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Ultraclear Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.
- C. Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise indicated, Quality-Q3.
- D. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

### 2.3 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL 9, including the hose-stream test, and shall comply with NFPA 80.
  1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from the hose-stream test.
- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to



be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.

- C. Laminated Ceramic Glazing: Laminated glass made from two plies of clear, ceramic glass; 8-mm total thickness; and complying with 16 CFR 1201, Category II.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. SAFTI FIRST Fire Rated Glazing Solutions.
    - b. Technical Glass Products.
    - c. Vetrotech Saint-Gobain.
- D. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, ultraclear float glass; with intumescent interlayers; and complying with 16 CFR 1201, Category II.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Pilkington North America.
    - b. Technical Glass Products.
    - c. Vetrotech Saint-Gobain.

## 2.4 FIRE-RESISTANCE-RATED GLAZING

- A. Fire-Resistance-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-resistance ratings indicated, based on testing according to ASTM E119 or UL 263.
- B. Fire-Resistance-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, that the glazing is approved for use in walls, and the fire-resistance rating in minutes.
- C. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, ultraclear float glass; with intumescent interlayers; and complying with 16 CFR 1201, Category II.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. SAFTI FIRST Fire Rated Glazing Solutions.
    - b. Technical Glass Products.
    - c. Vetrotech Saint-Gobain.

- D. Double Glazing Units with Clear Gel Fill: Double glazing units made from two lites of uncoated, fully tempered, ultraclear float glass; with a perimeter edge seal enclosing a cavity filled with optically clear, intumescent gel; and complying with 16 CFR 1201, Category II.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. SAFTI FIRST Fire Rated Glazing Solutions.

## 2.5 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. GE Construction Sealants; Momentive Performance Materials Inc.
    - b. The Dow Chemical Company.
    - c. Tremco Incorporated.
  2. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 GLAZING

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

### 3.2 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.

### 3.3 FIRE-PROTECTION-RATED GLAZING SCHEDULE

- A. Glass Type : 90-minute fire-protection-rated glazing with 450 deg F (250 deg C) temperature-rise limitation; laminated glass with intumescent interlayers.

### 3.4 FIRE-RESISTANCE-RATED GLAZING SCHEDULE

- A. Glass Type : 120-minute fire-resistance-rated glazing with 450 deg F (250 deg C) temperature-rise limitation; laminated glass with intumescent interlayers or double glazing units with clear gel fill. Samples must be submitted for Owner approval.

END OF SECTION 088813

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## SECTION 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Gypsum board shaft wall assemblies.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

#### 2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: As indicated on Drawings 2 hours.
- B. Gypsum Shaftliner Board:
  - 1. Type X: ASTM C1396/C1396M; manufacturer's proprietary fire-resistive liner panels with paper faces, 1 inch (25.4 mm) thick, with double beveled long edges.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) American Gypsum.
      - 2) National Gypsum Company.
      - 3) USG Corporation.
- C. Non-Load-Bearing Steel Framing, General: Complying with ASTM C645 requirements for metal unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.
- D. Studs: Manufacturer's standard profile for repetitive, corner, and end members as follows:

1. Depth: 6 inches (152 mm).
  2. Minimum Base-Metal Thickness: 0.030 inch (0.75 mm).
- E. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches (51 mm) long and matching studs in depth.
1. Minimum Base-Metal Thickness: Matching steel studs.
- F. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ClarkDietrich.
    - b. Fire Trak Corp.
    - c. SCAFCO Steel Stud Company.
- G. Finish Panels: Gypsum board as specified in Section 092900 "Gypsum Board."

## 2.3 AUXILIARY MATERIALS

- A. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
- C. Track 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.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- 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, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

- D. Penetrations: Install supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.
- F. Firestop Tracks: Install to maintain continuity of fire-resistance-rated assembly indicated.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.
- H. Remove and replace panels that are wet, moisture damaged, or mold damaged.

END OF SECTION 092116.23

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## SECTION 092216 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation reports for firestop tracks post-installed anchors and power-actuated fasteners.

#### 1.4 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association or the Steel Stud Manufacturers Association.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

#### 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.

2. Protective Coating: ASTM A653/A653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ClarkDietrich.
    - b. SCAFCO Steel Stud Company.
  2. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection.
  3. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where partitions extend to structure above provide one of the following:
1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch (38-mm) minimum vertical movement.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) ClarkDietrich.
      - 2) SCAFCO Steel Stud Company.
      - 3) Steel Construction Systems.
  2. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) ClarkDietrich.
      - 2) SCAFCO Steel Stud Company.
      - 3) Steel Construction Systems.
- D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. ClarkDietrich.
  - b. SCAFCO Steel Stud Company.
  - c. Steel Construction Systems.
  
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ClarkDietrich.
    - b. SCAFCO Steel Stud Company.
    - c. Steel Construction Systems.
  2. Minimum Base-Steel Thickness: 0.0269 inch (0.683 mm).
  
- F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ClarkDietrich.
    - b. SCAFCO Steel Stud Company.
    - c. Steel Construction Systems.
  2. Depth: 1-1/2 inches (38 mm) Insert depth.
  3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
  
- G. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
  1. Depth: 3/4 inch (19 mm).
  2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch (0.8 mm).
  3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
  
- 2.3 AUXILIARY MATERIALS
  - A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
  2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. Firestop Track: Install to maintain continuity of fire-resistance-rated assembly indicated.
- E. Direct Furring:
1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 092216

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## SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.
3. Glass-mat gypsum sheathing board.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Gypsum board, Type C.
4. Glass-mat gypsum sheathing board.
5. Cementitious backer units.
6. Interior trim.
7. Joint treatment materials.
8. Sound-attenuation blankets.
9. Acoustical sealant.

B. Samples: For each texture finish indicated on same backing indicated for Work.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

#### 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

## 2.3 INTERIOR GYPSUM BOARD

### A. Gypsum Wallboard: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. American Gypsum.
  - b. National Gypsum Company.
  - c. USG Corporation.
2. Thickness: 1/2 inch (12.7 mm).
3. Long Edges: Tapered.

### B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. American Gypsum.
  - b. National Gypsum Company.
  - c. USG Corporation.
2. Thickness: 5/8 inch (15.9 mm).
3. Long Edges: Tapered.

## 2.4 SPECIALTY GYPSUM BOARD

### A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. American Gypsum.
  - b. National Gypsum Company.
  - c. USG Corporation.
2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

## 2.5 TILE BACKING PANELS

### A. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:



- a. CertainTeed Corporation; Saint-Gobain North America.
  - b. National Gypsum Company.
  - c. USG Corporation.
2. Core: As indicated on Drawings.
  3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- B. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. CertainTeed Corporation; Saint-Gobain North America.
    - b. National Gypsum Company.
    - c. USG Corporation.
  2. Thickness: As indicated.
  3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

## 2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
  2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - c. L-Bead: L-shaped; exposed long flange receives joint compound.
    - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.

## 2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
  2. Exterior Gypsum Soffit Board: Paper.
  3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
  4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

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.
- D. Joint Compound for Exterior Applications:
1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
- E. Joint Compound for Tile Backing Panels:
1. Cementitious Backer Units: As recommended by backer unit manufacturer.

## 2.8 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. 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 (0.84 to 2.84 mm) thick.
  2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool. Install in all GWB walls.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."
- E. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

## PART 3 - EXECUTION

### 3.1 INSTALLATION AND FINISHING OF PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C840.

- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile.
  - 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- H. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- I. Cementitious Backer Units: Finish according to manufacturer's written instructions.

### 3.2 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

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## SECTION 095113 - ACOUSTICAL PANEL CEILINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.
- C. Field quality-control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. See structural drawings for seismic classification.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Class A according to ASTM E1264.

2. Smoke-Developed Index: 50 or less.

## 2.2 ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  1. American Gypsum.
  2. Armstrong Ceiling & Wall Solutions.
  3. USG Corporation.
- B. Acoustical Panel Standard: See drawings for scheduled Basis of Design Product. Manufacturer's standard panels according to ASTM E1264.
- C. Color: White.
- D. Light Reflectance (LR): As per Basis of Design Product listed on the drawings.
- E. Ceiling Attenuation Class (CAC): As per Basis of Design Product as listed on the Drawings.
- F. Noise Reduction Coefficient (NRC): As per Basis of Design Product as listed on the Drawings.
- G. Articulation Class (AC): As per the Basis of Design Product as listed on the Drawings.
- H. Edge/Joint Detail: As indicated by manufacturer's designation.
- I. Thickness: 3/4 inch (19 mm).
- J. Modular Size: 24 by 24 inches (610 by 610 mm).

## 2.3 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  1. Armstrong Ceiling & Wall Solutions.
  2. CertainTeed Corporation; Saint-Gobain North America.
  3. USG Corporation.
- B. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M.
- C. Basis of Design Suspension System: See drawings.

## 2.4 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Hold-Down Clips: Manufacturer's standard hold-down.
- C. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.
- D. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

## 2.5 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Armstrong World Industries, Inc.
  - 2. CertainTeed Corporation; Saint-Gobain North America.
  - 3. USG Corporation.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated.
- B. Layout openings for penetrations centered on the penetrating items.

### 3.2 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions for seismic classification noted on the structural drawings.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  - 1. Do not use exposed fasteners, including pop rivets, on moldings and trim.

2. Arrange directionally patterned acoustical panels as follows:
  - a. As indicated on reflected ceiling plans.
3. Install hold-down and seismic clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

END OF SECTION 095113



## SECTION 096513 - RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Thermoset-rubber base.
  - 2. Rubber accessories.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

### PART 2 - PRODUCTS

#### 2.1 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Flexco; Roppe Holding Company.
  - 2. Johnsonite; a Tarkett company.
  - 3. Roppe Corporation; Roppe Holding Company.
- B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
  - 1. Style and Location:
    - a. Style B, Cove: Provide in areas with resilient floor coverings and carpet tile and as indicated on the drawings.
- C. Thickness: 0.125 inch (3.2 mm).
- D. Height: 4 inches (102 mm).
- E. Lengths: Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.
- F. Outside Corners: Job formed or preformed.
- G. Inside Corners: Job formed or preformed.

- H. Colors: See Basis of Design Product and color as note on the finish plan.

## 2.2 RUBBER MOLDING ACCESSORY

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Roppe Corporation; Roppe Holding Company.
- B. Description: Rubber cap for cove carpet, cap for cove resilient floor covering, carpet edge for glue-down applications, reducer strip for resilient floor covering, joiner for tile and carpet transition strips.
- C. Profile and Dimensions: As indicated.
- D. Locations: where indicated and as required for finish transitions.
- E. Colors and Patterns: as indicated on the drawings.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
  - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 6 inches (76 mm) in length.
    - a. Form without producing discoloration (whitening) at bends.
  - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 6 inches (76 mm) in length.
    - a. Miter or cope corners to minimize open joints.

### 3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

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## SECTION 096519 - RESILIENT TILE FLOORING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Luxury Vinyl Tile

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and pattern specified.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

#### 2.2 SOLID VINYL FLOOR TILE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Armstrong Flooring, Inc.
  2. Mannington Mills, Inc.
  3. MetroFlor.

- B. Tile Standard: ASTM F1700.
  - 1. As per Basis of Design Product on the finish plan.
- C. Thickness: As per Basis of Design Product on the finish plan.
- D. Size: As per Basis of Design Product on the finish plan.
- E. Colors and Patterns: As per Basis of Design Product on the finish plan.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer.
  - 4. Retain "Moisture Testing" Subparagraph below; excessive moisture vapor can cause failure of resilient products adhered to concrete. ASTM F1869 (anhydrous calcium chloride test) and ASTM F2170 (relative humidity test) both recommend one test per 1000 sq. ft. (304.8 sq. m), but no fewer than three tests per test area.
  - 5. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.

- b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

- I. Final Cleaning: Follow manufacturers instructions for final cleaning and finishing.

END OF SECTION 096519



## SECTION 096813 - TILE CARPETING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Modular carpet tile.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture required.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

#### 1.7 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 CARPET TILE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Flor.
  2. Milliken & Company.
  3. Mohawk Group (The); Mohawk Carpet, LLC.
  4. Shaw Contract Group; a Berkshire Hathaway company.
- B. Color: As per Basis of Design Product indicated on the finish plan.
- C. Pattern: As per Basis of Design Product indicated on the finish plan..
- D. Fiber Content: As per Basis of Design Product indicated on the finish plan.
- E. Fiber Type: As per Basis of Design Product indicated on the finish plan.
- F. Pile Characteristic: As per Basis of Design Product indicated on the finish plan.
- G. Yarn Twist: Yarn Count: Density: "Pile Thickness" Pile Thickness: Stitches: Gage: Surface Pile Weight: Total Weight: As per Basis of Design Product.
- H. Primary Backing/Backcoating: Manufacturer's standard composite materials.
- I. Secondary Backing: Manufacturer's standard material.
- J. Size: Manufacturers Standard size
- K. Applied Treatments:
1. Soil-Resistance Treatment: Manufacturer's standard treatment.
  2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:
    - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
- L. Performance Characteristics:
1. As per Basis of Design Product.

### 2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

#### A. Concrete Slabs:

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
  - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
  - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
  - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

### 3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: 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 adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile 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 tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.
- I. Protect carpet tile 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 tile manufacturer.

END OF SECTION 096813

## SECTION 099113 - EXTERIOR PAINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
  1. Concrete.
  2. Concrete masonry units (CMUs).
  3. Steel and iron.
  4. Galvanized metal.
  5. Aluminum (not anodized or otherwise coated).

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint system and each color and gloss of topcoat.

#### 1.3 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    - b. Other Items: Architect will designate items or areas required.
  2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Behr Paint Company; Behr Process Corporation.
  - 2. PPG Paints.
  - 3. Sherwin-Williams Company (The).
- B. Basis of Design Products: Equivalent Products acceptable subject to compliance with requirements of this section and the Basis of Design products listed herein.
- C. Exterior Products: Basis of Design – Sherwin Williams
  - 1. Steel Handrails Prime Coat: B58W00610 - Macropoxy® 646 Fast Cure Epoxy Intermediate Coat: B58W00610 - Macropoxy® 646 Fast Cure Epoxy Finish Coat: B80T00504 - SHER-LOXANE 800 Polysiloxane
  - 2. Steel Bollards Prime Coat: B58W00610 - Macropoxy® 646 Fast Cure Epoxy Intermediate Coat: B58W00610 - Macropoxy® 646 Fast Cure Epoxy Finish Coat: B80T00504 - SHER-LOXANE 800
  - 3. Concrete Retaining walls First Coat: LX03W0100 - LOXON Acrylic Conditioner Second Coat: LX14W0051 - LOXON Self-Cleaning Acrylic Coating Finish Coat: LX14W0051 - LOXON Self-Cleaning Acrylic Coating. (only for walls without another finish specified on the drawings)

### 2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As indicated in a color schedule on drawings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and CMUs): 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099113



## SECTION 099123 - INTERIOR PAINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  1. Concrete.
  2. Concrete masonry units (CMUs).
  3. Steel and iron.
  4. Galvanized metal.
  5. Aluminum (not anodized or otherwise coated).
  6. Gypsum board.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.

#### 1.3 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    - b. Other Items: Architect will designate items or areas required.
  2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Benjamin Moore & Co.
  2. PPG Paints.
  3. Sherwin-Williams Company (The).
  4. Key Resin Company (special floors)
- B. Basis of Design Products: Equivalent Products acceptable subject to compliance with requirements of this section and the Basis of Design products listed herein.
- C. Interior Products: Basis of Design – Sherwin Williams
1. Concrete Block Walls First Coat: B42W00150 - Pro Industrial Heavy Duty Block Filler Second Coat: B73W00311 - Pro Industrial Waterbased Epoxy Finish Coat: B73W00311 - Pro Industrial Waterbased Epoxy
  2. Exposed Conc. hollow core panel ceilings First Coat: LX03W0100 - LOXON Acrylic Conditioner Second Coat: B73W00311 - Pro Industrial Waterbased Epoxy Finish Coat: B73W00311 - Pro Industrial Waterbased Epoxy
  3. GWB walls Prime Coat: B28W02600 - ProMar® 200 Zero VOC Interior Latex Primer White Intermediate Coat: B73W00311 - Pro Industrial Waterbased Epoxy Finish Coat: B73W00311 - Pro Industrial Waterbased Epoxy
  4. Special Floor Coating: Key Resin Company is Basis of Design Manufacturer. Products listed on drawings with variations noted for Lab area. Installation as per manufacturer specifications. Submit specific products for each location. Color has been chosen and is specified on drawings. Include integral cove base at all locations. Equivalent products can be submitted subject to requirements and comparison with the Key Resin Products.
- D. Special Interior Products: For Membrane and Tank Storage Areas
1. GWB walls Prime Coat: B28W02600 - ProMar® 200 Zero VOC Interior Latex Primer White Intermediate Coat: B62W00480 - DURA-PLATE 8200 Notes: Occasional or Intermittent splash and spill of Citric Acid up to 50% and Hydrochloric Acid up to 35% Finish Coat: B62W00480 - DURA-PLATE 8200 Notes: Occasional or Intermittent splash and spill of Citric Acid up to 50% and Hydrochloric Acid up to 35%
  2. CMU walls Prime Coat: B58W05100 - Corobond 100 Epoxy Primer Sealer Finish Coat: B62W00480 - DURA-PLATE 8200 Notes: Occasional or Intermittent splash and spill of Citric Acid up to 50% and Hydrochloric Acid up to 35%

3. Concrete walls Prime Coat: B58W05100 - Corobond 100 Epoxy Primer Sealer  
Finish Coat: B62W00480 - DURA-PLATE 8200 Notes: Occasional or Intermittent splash and spill of Citric Acid up to 50% and Hydrochloric Acid up to 35%
4. Misc. steel Prime Coat: B62W00480 - DURA-PLATE 8200 Notes: Occasional or Intermittent splash and spill of Citric Acid up to 50% and Hydrochloric Acid up to 35%  
Finish Coat: B62W00480 - DURA-PLATE 8200 Notes: Occasional or Intermittent splash and spill of Citric Acid up to 50% and Hydrochloric Acid up to 35%

## 2.2 GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
  1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As indicated in a color schedule on the drawings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  1. Concrete: 12 percent.
  2. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
  1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

END OF SECTION 099123

**SECTION 099600 - HIGH-PERFORMANCE COATINGS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. High performance coatings.
- B. Surface preparation.

**1.2 RELATED REQUIREMENTS**

- A. Section 331636 - Prestressed Concrete Storage Tanks.

**1.3 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 13 - Surface Preparation of Concrete 1997 (Reaffirmed 2003).

**1.4 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.
- C. Samples for Initial Selection: Manufacturer's color chart showing the full range of colors available for each type of finished-coat material indicated.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Maintenance Data: Include cleaning procedures and repair and patching techniques.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years documented experience.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Coating Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by

manufacturer's instructions.

- D. Protect materials from moisture and dust by storing in clean and dry location remote from construction operations. Additional protections shall be provided based on manufacturers recommendations.

1.7 FIELD CONDITIONS

- A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the coating product manufacturer.
- C. Do not install materials when temperature is below 55 degrees F (13 degrees C) or above 90 degrees F (32 degrees C).
- D. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
- E. Restrict traffic from area where coating is being applied or is curing.

1.8 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide high performance coating products from the same manufacturer to the greatest extent possible.
- B. High-Performance Coatings:
  - 1. Tnemec Company, Inc; [www.tnemec.com](http://www.tnemec.com)
  - 2. Carboline Company; [www.carboline.com](http://www.carboline.com)
  - 3. Induron Protective Coatings; [www.induron.com](http://www.induron.com)
  - 4. Key Resin Company ; [www.keyresin.com](http://www.keyresin.com)
  - 5. Substitutions: Section 016000 - Product Requirements.

2.2 HIGH-PERFORMANCE COATINGS

- A. Material Compatibility:
  - 1. All materials used with each paint system shall be compatible with one another and indicated substrates, as demonstrated by manufacturer under conditions of service and application, based on field experience and testing.
  - 2. Material Quality: Of the various high performance coatings specified, provide manufacturer's highest grade. Materials must display manufacturer's product identification.

2.3 TOP COAT MATERIALS

- A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.
  - 1. Volatile Organic Compound (VOC) Content:
    - a. Provide coatings that comply with the most stringent requirements specified in the following:
      - 1) 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
    - b. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having

jurisdiction.

2. Colors: Selected from manufacturer's standard colors.

## 2.4 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings until substrates have been properly prepared.
- C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- E. Proceed with coating application only after unacceptable conditions have been corrected.
  1. Commencing coating application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.
- C. Remove finish hardware, fixture covers, and accessories and store.
- D. Piping:
  1. Clean bolted connections, and areas where shop paint is abraded, paint exposed areas with the same material as used for shop priming.
- E. Concrete:
  1. Clean surfaces with pressurized water. Use pressure range of 1,500 to 4,000 psi (10,350 to 27,580 kPa) at 6 to 12 inches (150 to 300 mm). Allow to dry.
  2. Prepare surface as recommended by coating manufacturer and according to SSPC-SP 13 and ASTM D4258.
  3. Patch surface of concrete in accordance with manufacturers instructions for the system identified for the substrate.
- F. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

### 3.3 PRIMING

- A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

### 3.4 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified.
- B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.
- C. Brush Application: Use brushes best suited for material applied and of appropriate size for the surface or item being coated.

1. Apply primers and first coats by brush unless manufacturer's written instructions permit using a roller or mechanical applicators.
  2. Brush out and work brush coats onto surfaces in an even film.
  3. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.
- D. Rollers: Use roller of carpet, velvet back, or high pile sheep's wool as recommended by manufacturer for the material and texture required.
- E. Spray Equipment: Use mechanical methods to apply coating if permitted by manufacturer's written instructions and governing regulations.
1. Use spray equipment with profice size reccomended by manufacturer for material and texture required.
  2. Apply each coat to provide the equivalent hiding of brush applied coats.
  3. Do not double back with spray equipment building up film thickness of two coats in one pass, unless reccomended by the manufacturer.

3.5 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection.
- B. After protective coating has set hard to touch, it shall be inspected with high voltage holiday detection equipment. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to repair area. All touch up/repair procedures shall follow the protective coating manufacturer's reccomendations.
- C. Dry Film Thickness Testing: Owner will engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
1. Touch up and restore coated surfaces damaged by testing.
  2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, and specified thickness, Contractor shall pay for retesting and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations, and specified thickness.

3.6 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.
- D. Remove scaffolding, ladders, or other facilities upon the completion of Work.
- E. Remove temporary heating and ventilating facilities upon the completion of work.

3.7 PROTECTION

- A. Protect finished work from damage.

3.8 SCHEDULE

- A. Exterior (Outside of Buildings) Exposed Ferrous Metal, Ductile or Cast Iron Pipe, Pumps, and Valves.

Item/Subject	Carboline	Induron	Tnemec
Type	Epoxy/Polyurethane		
Surface Preparation	In accordance with manufacturer's instructions		
Primer	Carbogaurd 890 High	Perma-Clean II	Series N69 Hi-Build



	Build Epoxy DFT 3.0 to 5.0 mils	DFT 3.0 to 5.0 mils	Epoxoline II DFT 3.0 to 5.0 mils
Intermediate Coat	Carbogaurd 890 High Build Epoxy DFT 4.0 to 6.0 mils	Perma-Clean II DFT 4.0 to 6.0 mils	Series N69 Hi-Build Epoxoline II DFT 4.0 to 6.0 mils
Finish Coat	Carbothane 134HG Polyurethane DFT 2.0 mils	Indurethane 6600 DFT 2.0	Series 73, 1074, or 1075 Endura-Sheild DFT 2.0

B. Interior (Inside of Buildings) Exposed Ferrous Metal, Ductile or Cast Iron Pipe, Pumps, and Valves.

Item/Subject	Carboline	Induron	Tnemec
Type	Epoxy		
Surface Preparation	In accordance with manufacturer's instructions		
Primer	Carbogaurd 890 High Build Epoxy DFT 3.0 to 5.0 mils	Perma-Clean II DFT 3.0 to 5.0 mils	Series N69 Hi-Build Epoxoline II DFT 3.0 to 5.0 mils
Intermediate Coat	-	-	-
Finish Coat	Carbogaurd 890 High Build Epoxy DFT 4.0 to 6.0 mils	Perma-Clean II DFT 4.0 to 6.0 mils	Series N69 Hi-Build Epoxoline II DFT 4.0 to 6.0 mils

C. Immersed Ductile or Cast Iron Pipe, Pumps, and Valves.

Item/Subject	Carboline	Induron	Tnemec
Type	Epoxy	Ceramic Epoxy	Epoxy
Surface Preparation	In accordance with manufacturer's instructions		
Primer	-	Perma Clean II DFT 3.0 to 5.0 mils	Series N69 Hi-Build Epoxoline II DFT 3.0 to 5.0 mils
Intermediate Coat	-	-	-
Finish Coat	Bitumastic 300M Coal Tar Epoxy DFT 16.0 to 24.0 mils	Ceramasafe 90 DFT 14.0 to 20.0 mils	Series 46H-413 Hi-Build Tneme-Tar DFT 14.0 to 20.0 mils

D. Manholes to Sludge Ponds Interior Coatings

Item/Subject	Carboline	Induron	Tnemec
Type	Epoxy	Ceramic Epoxy	Epoxy
Surface Preparation	In accordance with manufacturer's instructions		
Primer	Semstone 110 Epoxy Primer DFT 4.0 - 6.0 mils	Perma-Clean II DFT 3.0 to 5.0 mils	Series 218 MotarClad 1/8 Inch
Intermediate Coat	-	-	Series 434 Perma-Shield H2S DFT 120.0 - 125.0 mils
Finish Coat	Plastite 4550S Flake Filled Novolac Epoxy DFT 25.0 - 35.0 mils	Ceramasafe 90 DFT 14.0 to 40.0 mils	Series 435 Perma-Glaze DFT 15.0 - 20.0 mils

E. CPVC and Polypropylene Chemical Piping Coating

Item/Subject	Carboline	Induron	Tnemec
Type	Polyurethane	Epoxy	Epoxy/Urethane
Surface Preparation	In accordance with manufacturer's instructions		
Primer	Sanitile 120 Acrylic Bonding Primer	-	Tnemec Series 27WB Typoxy
	DFT 1.0 - 2.0 mils	-	DFT 2.0 - 6.0 mils
Intermediate Coat	-	-	-
	-	-	-
Finish Coat	Carbothane 134HG Polyurethane	Perma-Clean II	Tnemec Series 740 UVX
	DFT 2.0 - 3.0 mils	DFT 3.0 to 5.0 mils	DFT 3.0 - 5.0 mils

F. Exterior Concrete Water Storage Tank Coating.

Item/Subject	Carboline	Induron	Tnemec
Type	Acrylic/Acrylate		
Surface Preparation	In accordance with manufacturer's instructions		
Primer	Flexxide Elastomer	AC 403 Acrylic Elastomeric	Series 156 Enviro-Crete
	DFT 6.0 mils	DFT 6.0 to 12.0 mils	DFT 4.0-8.0 mils
Intermediate	-	-	-
	-	-	-
Finish Coat	Flexxide Elastomer	AC 403 Acrylic Elastomeric	Series 156 Enviro-Crete
	DFT 6.0 mils	DFT 6.0-12.0 mils	DFT 4.0 to 8.0 mils

G. High Service Pump Station Interior Coating

Item/Subject	Carboline	Induron	Tnemec
Type	Epoxy	Ceramic Epoxy	Epoxy
Surface Preparation	In accordance with manufacturer's instructions		
Primer	Semstone 110 Epoxy Primer	Perma-clean II	Tnemec Series 218 MotarClad
	DFT 4.0 - 6.0 mils	DFT 3.0 to 5.0 mils	1/8 Inch
Intermediate	-	-	Series N140 Pota-Pox Plus
	-	-	DFT 4.0 - 8.0 mils
Finish Coat	Plastite 4550S Glass Filled Novolac Epoxy	Ceramasafe 90	Series 141 Epoxoline
	DFT 25.0 - 35.0 mils	DFT 3.0 to 5.0 mils	DFT 12.0 - 18.0 mils

H. Raw Water Transfer Pump Structure Concrete Coating

Item/Subject	Carboline	Induron	Tnemec
Type	Epoxy		
Surface Preparation	In accordance with manufacturers instructions		
Primer	Semstone 110 Epoxy Primer	Perma-Clean II	Tnemec Series 218 MotarClad
	DFT 4.0 - 6.0 mils	DFT 3.0 to 5.0 mils	1/8 Inch
Intermediate	-	-	Series N140 Pota-Pox Plus
	-	-	DFT 4.0 - 8.0 mils
Finish Coat	Plastite 4550S Glass Filled Novolac Epoxy	Perma-Clean II	Series 141 Epoxoline
	DFT 25.0 - 35.0 mils	DFT 4.0 to 6.0 mils	DFT 12.0-18.0 mils

I. Membrane & Chemical Room

Item/Subject	Carboline	Induron	Tnemec	Key Resin
Type	Epoxy			
Surface Preparation	In accordance with manufacturers instructions			
Primer			Series 242	
			3/16"	
Intermediate			-	
			-	
Finish Coat			Series 282	Key #570
			DFT 6.0-12.0 mils	2.75 -7.0 mils

END OF SECTION

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## SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cast dimensional characters.
  - 2. Fabricated channel dimensional characters.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signs.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
  - 3. Show message list, typestyles, graphic elements, and layout for each sign
- C. Samples: For each exposed product and for each color and texture specified. Provide samples for full range of manufacturer color selections.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 DIMENSIONAL CHARACTERS

- A. Fabricated Channel Characters: Metal face and side returns, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners; and as follows.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. APCO Graphics, Inc.
    - b. ASI Sign Systems, Inc.
    - c. Metallic Arts.
  2. Character Material: Sheet or plate aluminum.
  3. Character Height: As indicated on Drawings.
  4. Character Depth: 2" min.
  5. Finishes:
    - a. Integral Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.
    - b. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range.
    - c. Overcoat: Manufacturer's standard baked-on clear coating.
  6. Mounting: Manufacturer's standard concealed mounting for size and design of character.
    - a. Hold characters at manufacturer's recommended distance from wall surface.

### 2.2 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
1. Use concealed fasteners and anchors unless indicated to be exposed.
  2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
  3. Exposed Metal-Fastener Components, General:
    - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
  4. Sign Mounting Fasteners:

- a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
- b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

## 2.3 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 4. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
  - 5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
  - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods: (As approved by Architect)
  - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

- a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
    - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
  - 2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
    - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
    - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
  - 3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
- C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION 101419



## SECTION 101423.16 - ROOM-IDENTIFICATION PANEL SIGNAGE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes room-identification signs that are directly attached to the building.
- B. Related Requirements:

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For room-identification signs.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
  - 3. Show message list, typestyles, graphic elements, and layout for each sign at least.
- C. Samples: For each exposed product and for each color and texture specified. Final selection will be based up approval of samples.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

### 2.2 ROOM-IDENTIFICATION SIGNS

- A. Room-Identification Sign (See sheet A0.1): Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. APCO Graphics, Inc.
  - b. ASE, Inc.
  - c. ASI Sign Systems, Inc.
2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet.
  - a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
  - b. Surface-Applied Graphics: Applied vinyl film.
  - c. Subsurface Graphics: Reverse etch image.
  - d. Color(s): As selected by Architect from manufacturer's full range.
3. Sign-Panel Perimeter: Finish edges smooth.
  - a. Edge Condition: As indicated on Drawings Beveled.
  - b. Corner Condition in Elevation: As indicated on Drawings.
4. Frame: Entire perimeter.
  - a. Material: Manufacturer's standard as approved by Architect.
  - b. Profile: Beveled .
  - c. Corner Condition in Elevation: Square.
  - d. Finish and Color: As selected by Architect from manufacturer's full range.
5. Mounting: Manufacturer's standard method for substrates indicated with.

### 2.3 SIGN MATERIALS

- A. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

## 2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
  - 1. Use concealed fasteners and anchors unless indicated to be exposed.
  - 2. Sign Mounting Fasteners:
    - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.

## 2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 2. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 3. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- C. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
  - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
  - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
  - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

END OF SECTION 101423.16

## SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Public-use washroom accessories.
  - 2. Public-use shower room accessories.
  - 3. Under lavatory guards.
  - 4. Custodial accessories.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.5 WARRANTY

- A. Manufacturer's standard warranties for products in this section

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis of Design Products and Manufacturer listed on the drawings. Equivalent products subject to requirements and specification of Basis of Design Products. See below other items not listed on the drawings.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. American Specialties, Inc.
  - b. Bobrick Washroom Equipment, Inc.
  - c. Bradley Corporation.

B. Automatic Liquid-Soap Dispenser (Wall mounted next to each sink in building except Breakroom):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. AJW Architectural Products.
  - b. American Specialties, Inc.
  - c. Bradley Corporation.
2. Description: Automatic dispenser with infrared sensor to detect presence of hands; battery powered; designed for dispensing antibacterial soap in liquid or lotion form.
3. Materials: Manufacturers standard materials as approved by Architect.
4. Refill Indicator: LED indicator.
5. Low Battery Indicator: LED indicator.

### 2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Basis of Design Products and Manufacturer listed on the drawings. Equivalent products and manufacturers are acceptable subject to compliance with requirements and specifications of Basis of design products.:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. American Specialties, Inc.
  - b. Bobrick Washroom Equipment, Inc.
  - c. Bradley Corporation.

### 2.4 UNDERLAVATORY GUARDS

A. Under lavatory Guard Insert drawing designation:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Buckaroos, Inc.
  - b. Plumberex Specialty Products, Inc.

- c. Truebro by IPS Corporation.
- 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
- 3. Material and Finish: Antimicrobial, molded plastic, white.

## 2.5 CUSTODIAL ACCESSORIES

- A. Basis of Design Products listed on the drawings. Equivalent products are acceptable subject to requirements and Basis of Design specification.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. American Specialties, Inc.
    - b. Bobrick Washroom Equipment, Inc.
    - c. Bradley Corporation.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated or to ADA heights if not designated.

END OF SECTION 102800

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## SECTION 104416 - FIRE EXTINGUISHERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Six years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

## 2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Ansul by Johnson Controls Company.
    - b. Guardian Fire Equipment, Inc.
    - c. Kidde Residential and Commercial Division.
  - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type: UL-rated 20lb nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container. Use this type unless directed otherwise by local fire marshal.

## 2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Ansul by Johnson Controls Company.
    - b. Guardian Fire Equipment, Inc.
    - c. Kidde Residential and Commercial Division.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
    - a. Orientation: Vertical.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.

- B. Install fire extinguishers and mounting brackets in locations indicated below and in compliance with requirements of authorities having jurisdiction.
  - 1. Locations: Upstairs Breakroom and in hallway near door to membrane area. Downstairs in work shop and at each exit door in Membrane area for total of 7.
  - 2. Mounting Brackets: Top of fire extinguisher to be at 42 inches (1067 mm) above finished floor.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

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## SECTION 105113 - METAL LOCKERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Welded athletic lockers with legs. (size noted on drawings)

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each color specified.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
  - 1. Warranty Period for Welded Metal Lockers: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

## 2.2 WELDED ATHLETIC LOCKERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. ASI Storage Solutions; ASI Group.
  2. Olympus Lockers & Storage Products, Inc.
  3. Republic Storage Systems, LLC.
- B. Expanded-Metal Doors: Fabricated from 0.090-inch (2.28-mm) nominal-thickness expanded metal; welded to 0.105-inch (2.66-mm) nominal-thickness steel angle frame; with 0.090-inch (2.28-mm) nominal-thickness, steel sheet lock panel backed by 0.060-inch (1.52-mm) nominal-thickness, steel sheet retainer welded to door frame.
- C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
1. Tops and Bottoms: 0.060-inch (1.52-mm) nominal thickness, with single bend at edges.
  2. Backs: 0.048-inch (1.21-mm) nominal thickness.
  3. Shelves: 0.060-inch (1.52-mm) nominal thickness, with double bend at front and single bend at sides and back.
- D. Perforated Sides: Fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet with manufacturer's standard diamond perforations.
- E. Expanded-Metal Sides: Fabricated from 0.090-inch (2.28-mm) nominal-thickness expanded metal; welded to 0.105-inch (2.66-mm) nominal-thickness steel angles or 0.060-inch (1.52-mm) nominal-thickness steel channel frames.
- F. Frames: Channel formed; fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet or 0.097-inch (2.45-mm) nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
- G. Reinforced Bottoms: Structural channels, formed from 0.075-inch (1.90-mm) nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- H. Hinges:
1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- I. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking.
    - a. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism.

- J. Projecting Turn-Handle and Latch: Steel handle welded to manufacturer's standard, three-point, cremone-type latching mechanism consisting of steel rods or bars that engage locker frame at top and bottom of door, and center latch that engages strike jamb; with steel padlock loop.
- K. Door Handle and Latch for Box Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.
- L. Locks: Combination padlocks.
- M. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch (9 mm) high.
- N. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- O. Coat Rods: Manufacturer's standard.
- P. Legs: 6 inches (152 mm) high; formed by extending vertical frame members, or fabricated from 0.075-inch (1.90-mm) nominal-thickness steel sheet; welded to bottom of locker.
  - 1. Provide closed front and end bases.
- Q. Continuous Zee Base: 4 inches (102 mm) high; fabricated from 0.075-inch (1.90-mm) nominal-thickness steel sheet.
- R. Continuous Sloping Tops: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
  - 1. Closures: Vertical-end type.
- S. Recess Trim: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.
- T. Filler Panels: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.
- U. Boxed End Panels: Fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet.
- V. Finished End Panels: Fabricated from 0.024-inch (0.61-mm) nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- W. Materials:
  - 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- X. Finish: Baked enamel or powder coat.
  - 1. Color: As selected by Architect from manufacturer's full range.

## 2.3 LOCKS

- A. Combination Padlock: Provided by Owner.

## 2.4 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.
- C. Equipment: Provide each locker with an identification plate and the following equipment:
  - 1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
  - 2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
  - 3. Triple-Tier Units: One double-prong ceiling hook.
  - 4. Coat Rods: For each compartment of each locker.
- D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.
- E. Accessible Lockers: Fabricate as follows:
  - 1. Locate bottom shelf no lower than 15 inches (381 mm) above the floor.
  - 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches (1219 mm) above the floor.
- F. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.
- G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
- H. Individual Sloping Tops: Fabricated in width to fit one locker frame in lieu of flat locker tops; with integral back; finished to match lockers. Provide wedge-shaped divider panels between lockers.
- I. Recess Trim: Fabricated with minimum 2-1/2-inch (64-mm) face width and in lengths as long as practical; finished to match lockers.
- J. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.



- K. Boxed End Panels: Fabricated with 1-inch- (25-mm-) wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.
- L. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- M. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install lockers level, plumb, and true; shim as required, using concealed shims.
  - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
  - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
  - 3. Anchor back-to-back metal lockers to floor.
- B. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.
- C. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
  - 1. Attach recess trim to recessed metal lockers with concealed clips.
  - 2. Attach filler panels with concealed fasteners.
  - 3. Attach sloping-top units to metal lockers, with closures at exposed ends.
  - 4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
  - 5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

END OF SECTION 105113

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**SECTION 115300 - LABORATORY EQUIPMENT**

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Contractor-furnished laboratory equipment.
- B. Installation of Contractor-furnished (CFCI) equipment.
- C. Coordination with Owner-furnished Owner-installed (OFOI) equipment.

## 1.2 RELATED REQUIREMENTS

## 1.3 ABBREVIATIONS AND ACRONYMS

- A. OFOI - Owner Furnishes and Owner Installs.
- B. OFCI - Owner Furnishes and Contractor Installs.
- C. CFCI - Contractor Furnishes and Contractor Installs.

## 1.4 REFERENCE STANDARDS

- A. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2020a.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- C. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass 2014.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

## 1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of laboratory equipment with laboratory casework and Owner-furnished, Owner-installed laboratory equipment.
- B. Preinstallation Meeting: Convene one week before starting work of this section.
- C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

## 1.6 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide equipment dimensions and construction; equipment capacities; physical dimensions; utility and service requirements, clearances, and locations; required accessories and optional features; point loads.
- C. Shop Drawings: Indicate equipment locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, installation and servicing clearances required.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Test Reports: Factory tests for each type of equipment.
- F. Manufacturer's Installation Instructions: Indicate special installation requirements.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Operation Data: Include description of equipment operation and required adjusting and testing.
- J. Maintenance Data: Identify system maintenance requirements, servicing cycles, lubrication types required and spare part sources.
- K. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

- L. Project Record Documents: Record actual locations of concealed utility connections.

#### 1.7 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the types of products specified in this section, with minimum three years of documented experience.
- B. Preconstruction Testing: Factory-test each type of equipment.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Package each piece of equipment to ensure protection from damage during shipment and delivery. Legibly indicate on the exterior of each container or crate, the shipping address and a brief description of its contents. Outside of the container, fasten a waterproof envelope containing a packing list and complete instructions for uncrating and setting the equipment in place.
- B. Protect finished surfaces during handling and installation with protective covering of polyethylene film or another suitable material.

#### 1.9 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a two year period after Date of Substantial Completion.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Sterilizers and Glassware Washers:
  1. Hotpack, a brand of SP Scientific, a part of SP Industries, Inc: [www.hotpack.com](http://www.hotpack.com).
  2. Labconco Corporation: [www.labconco.com](http://www.labconco.com).
  3. Steelco Group: [www.steelcogroup.com](http://www.steelcogroup.com)
- B. Ice Machines:
  1. VWR International, LLC: [www.us.vwr.com](http://www.us.vwr.com)
  2. Hoshizaki America, Inc: [www.hoshizaki.com](http://www.hoshizaki.com).
  3. Manitowoc Ice Inc: [www.manitowocice.com](http://www.manitowocice.com).
  4. Or Approved Equal.
- C. Explosion Proof Refrigerator/Freezer Combination Units
  1. VWR International, LLC: [www.us.vwr.com](http://www.us.vwr.com)
  2. Thermo Fisher Scientific: [www.thermofisher.com](http://www.thermofisher.com)
  3. Or Approved Equal.

#### 2.2 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for all equipment.
- B. Comply with UL requirements for fabrication and installation of all equipment.

#### 2.3 EQUIPMENT

- A. Owner furnishes and installs equipment noted as OFOI.
- B. Contractor furnishes and installs equipment noted as CFCI.
- C. Each item energized by a single switch.
- D. Prewire and prepipe each unit of equipment complete with trim and fittings. Include reduced pressure or atmospheric type backflow preventer fitting to prevent backflow of polluted water or waste into water supply system or equipment. Comply with applicable code requirements.

- E. Affix a securely attached plate which includes the manufacturer's name, address, and catalog or serial number to each equipment item. If applicable, include pressure vessels bearing the ASME stamp and pressure rating, indicating compliance with applicable code requirements.
- F. Installation Accessories: Provide all rough-in frames, anchors, supports, accessories and closure trim required for complete installation.
- G. Use corrosion-resistant materials for all rivets, bolts, nuts, studs, spacers, and welding metal.
- H. Fully assemble equipment in factory, except for those items which cannot be moved to their final locations as single item due to new construction space restrictions.

## 2.4 GLASSWARE WASHERS

- A. Glassware Washer: (CFCI) Undercounter capacity.
  - 1. General: High-performance commercial-quality washer specifically designed for cleaning laboratory glassware of many sizes and types, with programmable treatment options and controlled intake of chemicals.
  - 2. Cabinet Enclosure: Yes.
  - 3. Mounting: On floor, undercounter.
  - 4. Heating: Steam.
  - 5. Doors: Number, type, and construction indicated.
    - a. Number of Doors: One.
    - b. Operation: Front, drop-down, manually-operated, spring counterbalanced; capable of supporting full glassware load and functioning as a loading platform to eliminate the requirement for a loading trolley; double-wall construction; insulated to minimize noise and surface temperature.
    - c. Double-pane tempered glass viewing panel.
    - d. Gaskets: Manufacturer's standard for type door specified, manufactured to withstand temperatures and pressures generated.
  - 6. Interior Illumination: Manufacturer's standard luminaire(s) located on top of the Washer, complete with electronic ballast, gasketed tempered safety glass diffuser, and using fluorescent lamps.
  - 7. Washing System: Manufacturer's standard, configured for two-level loading and washing, and rinse-water source options.
    - a. Materials: Type 304 stainless steel.
  - 8. Operator Controls: Digital type, with touch screen controls and multi-level menus.
    - a. Reprogrammable cycle configurations.
    - b. Virtual Keypad: Allowing operator to easily control all programmable equipment functions, access all equipment monitoring functions, and operate the equipment. At a minimum, allowing the following functionality:
      - 1) Selecting a program.
      - 2) Presetting main parameters, including sterilization temperature and time, dry time, and set real time clock.
      - 3) Starting a cycle.
      - 4) Stopping a cycle.
    - c. Status Indication: Showing status of critical equipment operation. At a minimum, provide indicators for:
      - 1) Start: Indicating required temperature is available for unit operation.
      - 2) Heat: Indicating unit is in the heating stage.

- 3) Drying: Indicates unit is in the drying stage.
  - 4) Fail: Indicates system has failed as a result of protective cut-off or because Stop button has been pressed. Failure message appears on display.
9. Control and Monitoring System: Controller, gauges, sensors and wiring.
    - a. Controller: Microcomputer based controller monitoring and controlling all aspects of equipment cycle and process operations. Provide battery backup of microprocessor memory. Controller to ensure fully automatic operation through all equipment cycles.
  10. Cycle Descriptions: Basic types included, as indicated.
    - a. Wash Cycle: Load sprayed with recirculated solution at operator-selected temperature of up to 199 degrees F (93 degrees C) for an operator-selected interval in range of 0-15 minutes. Cycle programmed not to start until selected temperature is reached. Required.
    - b. Rinse Cycle: Load sprayed with recirculated water at operator-selected temperature of up to 199 degrees F (93 degrees C) for an operator-selected duration in range of 0-15 minutes. Cycle programmed not to start until selected temperature is reached. Required.
    - c. Pure Water Rinse Cycle: Load sprayed with recirculated water at operator-selected temperature of up to 199 degrees F (93 degrees C) for an operator-selected duration in range of 0-15 minutes. Cycle programmed not to start until selected temperature is reached. Required.
  11. Personnel Safety: Integrated personnel safety features typical to the industry.
    - a. Safety Door Switch(es): Preventing cycle operation if door(s) not fully-closed.
    - b. Effective design, insulation and fabrication preventing hot surfaces on the exterior of the unit.
  12. Wash Chamber: Rectangular design, with internal corners longitudinally radiused and polished. All welds ground smooth and polished.
  13. Insulation: Manufacturers standard type, with vapor-retarder, covering the outer top, sides and bottom of washer chamber.
  14. Sensors and Gauges: Provide as appropriate to units specified. Install to be easily removable for calibration except where required to be calibrated in place.
  15. Effluent Temperature Cooling and Control System: Integral system to ensure maximum effluent temperature discharged to floor drain does not exceed 140 degrees F (60 degrees C).
  16. Accessories: Provide the following items:
    - a. Upper and lower standard racks.
  17. Utility Requirements:
    - a. Electrical: 3 phase, 60 Hz
    - b. Steam: 1/2 inch NPS FPT (15 mm DN); 50-80 psi (345-551 kPa); Condensate free, and 97 percent to 100 percent vapor quality.
    - c. Condensate: 1/2 inch NPS FPT (15 mm DN).
    - d. Cold Water: 1/2 inch NPS FPT (15 mm DN); 35 psi (241 kPa) minimum.
    - e. Hot Water: 1/2 inch NPS FPT (15 mm DN); 35 psi (241 kPa) minimum; 120-180 degrees F (48.9-82.2 degrees C).
    - f. Drain Outlet: 1 1/2 inch NPS FPT (40 mm DN); 140 degrees F (60 degrees C) maximum.
    - g. Compressed Air: 1/8 inch NPS FPT (6 mm DN).

## 2.5 ICE MAKERS

- A. Ice Maker: (CFCI) Ice machine(s) and storage bin combination unit.
1. General: High-performance commercial-quality ice machine and storage bin combo specifically designed for making ice of selected sizes and shapes for laboratory use.
  2. Ice Shape: Cubes.
  3. Production: 24-hour volume of 233 pounds (106 kg).
  4. Number of Ice Machines: One.
  5. Storage Bin Capacity: 370 pounds (168 kg).
  6. Condenser Type: Air-cooled.
  7. Mounting: Floor-mounted storage bin on legs with levelers, bin-mounted ice machine, with bin adapter.
  8. Ice machine:
    - a. Front-located air filter.
    - b. Anti-microbial agent protection.
    - c. Flush cycle operation for sediment removal.
    - d. Controls: Digital.
      - 1) Status Indication: Showing status of critical equipment operation.
      - 2) Operational Data Handling: Electronic storage and display.
      - 3) On/off switch.
      - 4) Ice/drain switch.
      - 5) Alarm conditions signaling.
  9. Sensors and Gauges: Provide as appropriate to units specified. Install to be easily removable for calibration except where required to be calibrated in place.
    - a. Infrared sensor for controlling level of ice in ice machine/storage bin.
  10. Utility Requirements Ranges:
    - a. Ambient Air Temperatures: 50 to 100 degrees F (10 to 38 degrees C).
    - b. Incoming Water Temperature: 40 to 100 degrees F (4.4 to 38 degrees C).
    - c. Electrical Voltage Fluctuation: Minus 5 percent to plus 10 percent.
    - d. Electrical: 1 phase, 60 Hz, 115 V.

## 2.6 EXPLOSION PROOF REFRIDGERATOR/FREEZER COMBINATION UNIT

- A. Refridgerator: (CFCI) All refridgerator(s) are to be refridgerator and freezer combination unit.
1. Product Requirements
    - a. Refrigerator should maintain a temperature range of greater than 1° to 5°C.
    - b. Freezer should maintain a temperature range of greater than
    - c. Capacity: Minimum 10 cu. ft.
    - d. Maximum exterior dimensions:
    - e. Number of shelves: Minimum of 3 with at least 2 adjustable shelves in refridgerator.
    - f. Refridgerator and Freezer shall have seperate, exterior doors.
  2. Thermometer

- a. Calibrated thermometers should be graduated in at least 1°C increments and the thermometer bulb immersed in liquid.

3. Electrical: 60 Hz, 115 V.

## 2.7 MATERIALS

- A. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304 and 316, stretcher-leveled standard of flatness.
- B. Laminated Safety Glass: ASTM C1172
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Fasteners: Stainless-steel, or other corrosion-resistant materials, standard with the manufacturer.

## 2.8 SOURCE QUALITY CONTROL AND TESTS

- A. Provide shop inspection and testing for all equipment items.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that utility connections, rough-in frames, anchors and supports are accurately placed and deliver building services at specified characteristics and/or within acceptable functional ranges.
- B. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Installation of equipment noted as OFCI or CFCI is by Contractor. Coordinate with equipment furnished and/or installed by Owner.
- B. Install in accordance with manufacturer's instructions.
- C. Install in accordance with standards required by authority having jurisdiction.
- D. Large Components: Ensure that large components can be moved into final position without damage to other construction.
- E. Mounting: Anchor equipment securely in place.
- F. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner, and their locations are coordinated with equipment rough-in requirements.
  1. Require manufacturer's installer to supervise connection to utilities being performed by mechanical and electrical trades.
- G. Touch-up minor damaged surfaces caused during installation. Replace damaged components as directed by Engineer.

### 3.3 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Perform functional testing in accordance with referenced specification requirements. Test one item or similar model, as necessary or appropriate, to ensure that it is operational and installation complies with specification requirements.

### 3.4 ADJUSTING

- A. Adjust operating equipment to efficient operation.

### 3.5 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.



- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate operation of system to Owner's personnel.
  - 1. Use operation and maintenance data as reference during demonstration.
  - 2. Conduct walking tour of project.
  - 3. Briefly describe function, operation, and maintenance of each component.
- D. Training: Train Owner's personnel on operation and maintenance of system.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
  - 2. Provide minimum of two hours of training.
  - 3. Location: At project site.
- E. Final Acceptance: Remove labels, fingerprints, and clean all surfaces both inside and out. Repair any marred or damaged surfaces that affect appearance, such as both interior and exterior of cabinets in a manner acceptable to Owner. Replace any parts that cannot be repaired in such a manner.

### 3.6 MAINTENANCE

- A. See Section 017000 - Execution, for additional requirements relating to maintenance service.

### 3.7 SCHEDULE

- A. See drawings for Laboratory Equipment Schedule.

END OF SECTION

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**SECTION 115313 - LABORATORY FUME HOODS AND BIOSAFETY CABINETS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Standard laboratory fume hoods.
- B. Fume hood base cabinets and stands.
- C. Exhaust Blowers.
- D. Biosafety Cabinets (Microbiological Cabinet).
- E. Work surfaces.
- F. Laboratory cup sinks in fume hoods.
- G. Service fittings and outlets.
- H. Airflow indicators and alarms.
- I. Piping within fume hoods for service fittings.
- J. Wiring within fume hoods for light fixtures and receptacles.

**1.2 RELATED REQUIREMENTS**

- A. Section 123553.19 - Wood Laboratory Casework: Additional requirements for base cabinets for fume hoods.
- B. Section 230593 - Testing, Adjusting, and Balancing for HVAC: Field quality-control testing of fume hoods.

**1.3 REFERENCE STANDARDS**

- A. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods 2016.
- B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2020a.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2020.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021.
- F. NFPA 45 - Standard on Fire Protection for Laboratories Using Chemicals 2015.
- G. SEFA 1 - Laboratory Fume Hoods 2010.
- H. UL 1805 - Standard for Safety Laboratory Fume Hoods and Cabinets 2006.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate installation of fume hoods with laboratory casework and other laboratory equipment.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

**1.5 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide fume hood exterior and interior dimensions and construction, utility and service requirements and locations.
- C. Shop Drawings: Indicate locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required, locations and types of service fittings.

- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements. Provide documentation of successful Factory Acceptance Testing.
- E. Test Reports: Indicate that each type of fume hood has been factory-tested and meets specified ASHRAE Std 110 (AM) requirements.
- F. Manufacturer's Installation Instructions: Indicate special installation requirements.
- G. Operation Data: Include description of equipment operation and required adjusting and testing.
- H. Maintenance Data: Identify system maintenance requirements, servicing cycles, lubrication types required and local spare part sources.
- I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- J. Project Record Documents: Record actual locations of concealed utility connections.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- D. Preconstruction Testing: Factory-test each type of hood as per referenced standard.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or another suitable material.

1.8 FIELD CONDITIONS

- A. Ambient Conditions: Maintain temperature and relative humidity at occupancy levels during and after installation of fume hoods.

1.9 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide one year manufacturer warranty for manufacturer's standard items (listed by part number in manufacturer's official publication).

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Metal Laboratory Fume Hoods:
  - 1. Labconco: [www.labconco.com](http://www.labconco.com)
  - 2. Kewaunee Scientific Corp: [www.kewaunee.com](http://www.kewaunee.com)
- B. Provide laboratory fume hoods and biosafety cabinet from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fume Hoods:
  - 1. Fume hoods shall provide and function as ventilated, enclosed workspaces, designed to capture, contain and exhaust fumes, vapors and particulate matter produced within the enclosure.
  - 2. Fume hood shall be factory designed to function as a by-pass fume hood or as a variable air volume fume hood without modification.

3. Fume hoods complying with the following when tested in accordance with ASHRAE Std 110:
    - a. As-Manufactured (AM) Rating: AM 0.01 (0.01 ppm).
    - b. As-Installed (AI) Rating: AI 0.10 (0.10 ppm).
    - c. Average Face Velocity: 50 fpm plus or minus 10 percent with sashes fully open.
    - d. Face-Velocity Variation: Not more than 10 percent of average face velocity across the face opening with sash(es) fully open.
  4. Release Rate: 4.0 L/min.
  5. Static-Pressure Loss: Not more than 1/2-inch w.g. (124 Pa) at 100 FPM (0.51 m/s) face velocity with sash fully open when measured at four locations 90 degrees apart around the exhaust duct and at least three duct diameters downstream from duct collar.
- B. Biosafety Cabinets:
1. Biosafety Cabinets shall provide biological containment protection for both operator and product proven by an actual test, and routinely validated by the manufacturer.
    - a. Containment of biological hazards is achieved through a combination of HEPA filtration and directional, controlled airflow.
  2. Biosafety cabinets complying with the following when tested in accordance with ASHRAE Std 110:
    - a. As-Manufactured (AM) Rating: AM 0.01 (0.01 ppm).
    - b. As-Installed (AI) Rating: AI 0.10 (0.10 ppm).
    - c. Airflow:
      - 1) Calculated Air Velocity: 100 to 110 fpm through fully open sash.
      - 2) Measured Down flow Velocity: 50 to 60 fpm measured 4" above operating sash opening.
      - 3) Blower with Electronically Commutated Motor (ECM) shall be programmed to deliver a precise volume of air as required and automatically adjust as filters load without relying on airflow sensors and protected from voltage fluctuation.
  3. HEPA Filters
    - a. One supply and one exhaust HEPA filter. Each shall be minimum of 99.99% efficient on all particles 0.3 micrometers as scan-tested with DOP or equivalent.
    - b. HEPA filters shall be industry-standard size.
    - c. Motor-Blower shall be positioned so as to promote even filter loading, thereby prolonging the life of the HEPA filters.
    - d. Motor-Blower shall automatically handle HEPA filter pressure equal to 200% of initial pressure without reducing total air delivery by more than 2%.
  4. Controls and Display
    - a. Cabinet shall utilize a microprocessor control system.
    - b. Accessible mounted controls for operation of:
      - 1) Blower
      - 2) Light
      - 3) Electrical Outlets
      - 4) UV Light
      - 5) Timers

- 6) Alarm Mute (5 minute ring-back)
- 7) Menu Navigation
- c. Navigation Operating System performs the following functions:
  - 1) User Programmable and customizable biosafety cabinet operation (including blower, light, optional UV light, and timer functions) controllable by movement and position of the Safety Glass Sash.
  - 2) User Programmable and customizable biosafety cabinet operation that idles the motor in a reduced flow mode, reducing energy consumption by over 80% while maintaining ISO Class 5 conditions.
  - 3) Digital 12- or 24-hour clock.
- d. HEPA filter life is displayed as a percentage using real time feedback from the ECM-blower's performance.
  - 1) Complete diagnostic and troubleshooting functionality.
  - 2) Security password protection of cabinet use.
  - 3) Programmable timed operation of fluorescent.
  - 4) Password Protected Service menu for calibration and configuration of biosafety cabinet installation and operational parameters.
  - 5) Selectable units of measure (Imperial or Metric).
5. Alarms and Alerts – The cabinet shall provide both an audio signal and digital display that communicates and describes the alarm condition, provides corrective actions and utilizes a cross sectional diagram highlighting the potentially affected areas of the biosafety cabinet. Alarms shall exist for the following conditions:
  - a. Sash Height Alarm – indicating that the sash is higher than its nominal set point.
  - b. Airflow Alert – signifies that the automatically adjusting blower has had to make an abrupt change in order to maintain safe airflow.
  - c. Airflow Alarm – (If equipped with an airflow sensor) indicates that inflow or downflow velocities are excessively high or low.
  - d. Canopy Alarm – (If Canopy Kit is installed) indicates insufficient exhaust system airflow. (See Canopy Kit Accessory Details)
  - e. System Error – Indicates a failure in the communication between the microprocessor controller and the ECM blower.
6. Noise
  - a. Sound level (as factory tested) shall be no more than 63 dBA measured 15 inches above the work surface and 12 inches in front of the safety glass sash, as stated by NSF/ANSI Standard 49.
7. Illumination
  - a. Fluorescent lighting shall provide 90 to 150 foot-candles on work surface per NSF/ANSI Standard 49. The ballast is to be electronic containing thermal protection with automatic reset.
  - b. Fluorescent lighting shall be externally mounted from the work zone, energy efficient, and replaceable from front of the biosafety cabinet.
8. Pass-through and Bulkheads
  - a. Sealed Service Pass-Through – All permanent and durable structures for the passing of electrical wires, cords and tubes are to be permanently sealed air-tight, and shall not allow for movement of the items passing through.
  - b. Sealed Service Penetration – Penetrations will be air tight and sealed, and will provide for the addition of field installed service fixture/valves or testing equipment.

- c. User-Modified Pass-Through – Cord, Tube & Cable Portals for the passing of such so to connect to instruments, one inside the biosafety cabinet, the other outside. Shall provide an airtight seal and be protected by a vacuum or negative pressure source.
- d. All Pass-Through & Bulkhead types shall be tested and approved by NSF to the NSF/ANSI Standard 49.

## 2.3 FUME HOODS AND BIOSAFETY CABINETS

### A. General Requirements:

- 1. Comply with SEFA 1.
  - a. Provide fume hoods UL listed and labeled for compliance with UL 1805.
- 2. Pre-pipe fume hoods for service fittings.
- 3. Pre-wire fume hoods for light fixtures and receptacles.
  - a. Terminate all wiring in a junction box on top of hood.

### B. Fume Hood:

- 1. General Material Properties:
  - a. Nonflammable, corrosion and chemical-resistant.
  - b. Sheet molded homogenous polyester panels.
  - c. Smooth finish.
- 2. Flame and Smoke Characteristics:
  - a. Flame retardant, self-extinguishing, with a flame spread rating of 25 or less in accordance with ASTM-E84.
  - b. Oxygen Index: 35%
  - c. Smoke Density: 115
- 3. Chemical Resistance:
  - a. Prepare, treat, and finish welded assemblies after welding. Prepare, treat, and finish components that are to be assembled with mechanical fasteners before assembling.
  - b. Finish shall comply with levels of cabinet surface finish tests of SEFA 8.
- 4. Exterior:
  - a. Fabricate from steel sheet with component parts screwed together.
  - b. Apply chemical-resistant finish to interior and exterior surfaces of component parts before assembly.
  - c. Interchangeable side panels shall lift off without the use of tools to allow access to plumbing lines, service fittings, electrical wiring, counterbalance sash weights, and light fixtures. Exposed fasteners or hardware, and Velcro type fasteners, are not acceptable.
- 5. Dimensions:
  - a. Nominal Interior width: 48 inches
- 6. Configuration: Standing-height; bench mounted.
- 7. Sash Type: Vertical rising.
  - a. Configuration: Full sash opening height is 28", the total unobstructed viewing height is 3705" measured from the work surface..
  - b. Leak-free enclosure box, manufacturer's standard construction, for vertical rising sash with unobstructed, side-to-side view of fume hood interior and service fixture connections.

- c. Glazing: Laminated safety glass.
  - d. Sash Guides: Corrosion-resistant steel track.
  - e. Vertical Sash mechanism: Designed to prevent sash drop in case of mechanism failure.
    - 1) Cable: Minimum 3/32 inch (2 mm) thick stainless steel of construction standard with the manufacturer.
      - (a) Sprocket system for Sash Chain: Hardened sprockets with one full-width shaft per sash, running in ball-bearings.
  - f. Vertical Sash Pull: Type 316 stainless steel, with No.4 finish.
  - g. Sliding Safety Shield: Manufacturer's standard removable polycarbonate shield able to slide the full width of fume face opening, with ball-bearing rollers at top for suspension from track at top of sash opening, and guide at bottom to keep shield from swinging.
  - 8. Top Front Panel: Standard integral grille stamped into panel of same materials as fume hood exterior.
  - 9. Interior Lining: Polypropylene.
    - a. Color/Finish: White.
  - 10. Service Fittings and Fixtures:
    - a. As specified in 123553.19 - Wood Laboratory Casework.
  - 11. Ergonomics – The fume hood cabinet shall be ergonomically designed for maximum user comfort and adjustability to meet the requirements of the American with Disabilities Act (ADA).
  - 12. Access Panels: Provide removable panels on both sides hood exterior and interior lining panels.
  - 13. Exhaust Blowers:
    - a. Dedicated exhaust blower at each fume hood indicated to be individually exhausted, of airflow capacity recommended by fume hood manufacturer.
      - 1) Type: Direct drive.
      - 2) Materials: Epoxy-coated steel.
      - 3) Controls: On/Off using Fan switch located on fume hood post at heights compliant with Americans with Disabilities Act (ADA).
      - 4) Model selection coordinated with expected static pressure losses in exhaust ductwork.
- C. Biosafety Cabinet Class I:
- 1. Biosafety Cabinet Interior
    - a. Unitized single-frame construction of 16 gauge, 304 Stainless steel. Shall pass factory test for holding pressure of 2" w.g. per NSF/ANSI Standard 49.
    - b. Cabinet assembly shall be constructed such that all positive pressure contaminated plenums are surrounded by negative pressure plenums.
    - c. Internal air balancing system shall be accessible from the outside of the biosafety cabinet, and adjustable with a standard hex-nut driver.
    - d. The Work Surface shall be of single piece, stamped, construction with no welding, applied sealant or solder used to seal any surface. All internal radiuses are 1/2" or greater.
    - e. A metallic diffuser screen shall promote true laminar air flow.
    - f. The cabinet shall accommodate up to 4 service fixtures.



- g. The cabinet shall be double wall construction with negative pressure airflow from drain pan to top surrounding the back of work area.
2. Biosafety Cabinet Exterior:
  - a. The cabinet shall be double wall construction with negative pressure airflow from drain pan to top surrounding the back of work area.
  - b. HEPA filters are removable from the front of the cabinet.
  - c. A steel diffuser shall be mounted on top of the biosafety cabinet to promote proper exhaust airflow and protect the Exhaust HEPA filter.
3. Dimensions:
  - a. The biosafety cabinet shall be capable of transport through a 32" wide opening.
  - b. Nominal Interior Width: 24 inches
4. Blower:
  - a. Blower assembly shall be direct drive powered by energy saving ECM motor type.
    - 1) For nominal interior width 48 inches or less, utilize a 1/2 HP ECM.
    - 2) Motor mounting system shall consist of 16 Gauge, stamped steel legs with integral vibration isolation.
  - b. Motor mounting system shall consist of 16 Gauge, stamped steel legs with integral vibration isolation.
5. Sash Assembly:
  - a. Motor mounting system shall consist of 16 Gauge, stamped steel legs with integral vibration isolation.
  - b. Sash shall be capable of being closed when cabinet is not in operation.
  - c. Sash shall fully open to a height of 9.4".
  - d. Total sash height shall provide a viewing window that is no less than 20.8" tall.
  - e. A sash position indicator shall identify to the user where the sash is to be open to its optimum operating level.
  - f. Sash shall not require removal for routine filter or motor/blower service.
  - g. Bottom edge of sash shall be frameless and ground to a smooth edge so as to not disrupt line of sight. Framed sashes are not acceptable.
  - h. Provide guides capable of holding the sash in place regardless of position and cushion sash with bumpers when fully opened or closed.
  - i. Maximum force required to operate sash shall not exceed 7 lbs.
6. Exhaust Connection:
  - a. 316 Stainless Steel with chemical-resistant Finish.
7. Ergonomics – The biosafety cabinet shall be ergonomically designed for maximum user comfort and adjustability to meet the requirements of the American with Disabilities Act (ADA).
  - a. Biosafety Cabinet installation with base stand shall be positioned to provide work surface heights between 30" and 37", and be in compliance with ADA.
  - b. Safety Glass Sash Assembly shall be anti-racking and counterbalanced with a weight and pulley system allowing for effortless movement up and down with one hand. Sash shall open to 21.7". Spring-loaded sash counterbalances require greater force as the sash raises and exerts force against the user's arms, this design is not acceptable.
  - c. Air Inlet Grille shall have a large (greater than 2") integrated curved armrest to provide comfort for user when in a resting position while maintaining containment

- performance. Hard and sharp angles and elevated add-on arm/elbow rests promote poor ergonomic posture and are not acceptable.
- d. Maximum visibility into cabinet work zone shall be at least 27" from front access airfoil to exterior light housing.
  - e. The biosafety cabinets work surface shall have easy-lift knobs located on the front corners and be removable through the front opening. The stamped dish will have coved corners for easy cleaning.
  - f. The biosafety cabinet shall have a 10° slope front.
  - g. All controls (touchpad, service fixtures valves, electrical outlet duplexes, cord and cable portals) shall be in compliance with ADA.
  - h. The digital display shall be positioned line-of-sight while seated at the biosafety cabinet and communicate cabinet status and programming in full intuitive sentences.
8. Configuration: Sitting-height; bench mounted.
  9. Top Front Panel: Standard integral grille stamped into panel of same materials as fume hood exterior.
  10. Interior Lining: Polypropylene.
    - a. Color/Finish: White.
  11. Access Panels: Provide removable panels on both sides hood exterior and interior lining panels.
  12. Work Surface:
    - a. Work Top for Fume Hoods Other Than Floor-mounted Type: Epoxy resin.
      - 1) Edge: Raised rim with rounded edges and corners.
- D. Fume Hood and Biosafety Base Cabinets:
1. See Section 123553.19 - Wood Laboratory Casework .
  2. Exterior construction: Wood Cabinets.
    - a. Standard storage cabinets.
  3. Material: Wood.
  4. Color/Finish: Provide sample color/finish to be approved by Owner.
- E. Fume Hood and Biosafety Cabinet Base Stands:
1. Leg Levelers: Manufacturer's standard.
  2. Leg Shoes: Manufacturer's standard.
  3. Structural Performance: Capable of withstanding 50 pounds per foot (74 kg/m) work top, 75 pounds per foot (112 kg/m) on work top, plus weight of hood, without permanent deformation or excessive deflection.
  4. The rear panel will feature a 12" x 8" removable plumbing access panel.
- F. Light Fixtures: UL labeled, vapor proof, one-tube, T-5 fluorescent light fixtures. Number and length of fixtures as necessary for fume hood width. Mounted above sealed safety glass panel. White baked-enamel finish on fixture interior.

## 2.4 FABRICATION

- A. General: Assemble fume hoods in factory to greatest extent possible. Disassemble fume hoods only as necessary for shipping and handling limitations, or as necessary to permit movement through a 35 inches by 79 inches (889 mm by 2007 mm) clear door opening.
- B. Steel Exterior: Fabricated from steel sheet, 0.048 inch (1.21 mm) thick, with component parts screwed together to allow removal of end panels, front fascia, and airfoil and to allow access to plumbing lines and service fittings. Chemical-resistant finish applied to interior and exterior surfaces of component parts before assembly.

- C. Ends: Fabricated with double-wall end panels. Close area between double walls at front of fume hood and as needed to house sash counterbalance weights, utility lines, and remote-control valves.
- D. Lining Assembly: Unless otherwise indicated, assembled with stainless-steel fasteners, concealed where possible. Joints sealed by filling with chemical-resistant sealant during assembly.
  - 1. Punched fume hood lining side panels for service fittings and remote controls. Removable plug buttons for holes not used for indicated fittings.
  - 2. Each side wall shall include an interior access panel to provide access to the side wall of the fume hood for plumbing service access. Access panel material shall be that of the liner, and gasketed to form a vapor proof seal.
- E. Rear Baffle: Same material as fume hood lining, unless otherwise indicated, at rear of hood with openings at top and bottom, with corrosion-resistant fasteners. Fabricated for removal to facilitate cleaning behind baffle.
  - 1. Preset baffles, unless otherwise indicated. Baffle system shall be designed to optimize the face velocity profile, and to capture a wide range of gaseous densities without adjustment or moving components.
  - 2. Exposed components to be non-metallic. Metal components exposed to chemical environment are not acceptable.
- F. Exhaust Plenum: Full width of fume hood, sized and configured to provide uniform airflow, of same material as hood lining, and with duct stub for exhaust connection.
  - 1. Duct-Stub Material: Epoxy-coated steel, unless otherwise indicated.
  - 2. 12.81" ID to accommodate any 12" nominal duct without the need for a transition adapter. Additional components required to accommodate 12" nominal mechanical system are not acceptable.
- G. Airfoil: At bottom of fume hood face opening, with 1 inch (25.4 mm) gap between bottom of airfoil and work top. Sash to close on top of airfoil. Designed to direct airflow across work.
  - 1. Fabricated from 316 stainless steel with chemical resistant finish.
- H. Finished Back Panels: Where rear surfaces of fume hoods are exposed to view, provide finished back panels matching rest of fume hood enclosure.
- I. Comply with requirements of other sections for factory installation of water and laboratory gas service fittings, piping, electrical devices, and wiring. Securely anchor fittings, piping, and conduit to fume hoods, unless otherwise indicated.

## 2.5 MATERIALS

- A. Steel Sheet: Cold-rolled, commercial steel (CS) sheet, complying with ASTM A1008/A1008M; matte finish; suitable for exposed applications.
- B. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Fasteners: Stainless-steel, where exposed to fumes.

## 2.6 ACCESSORIES

- A. Airflow Monitors/Indicators and Alarms: Provide each fume hood with an airflow monitor/indicator complete with an audible and visual alarm that activates when airflow sensor reading is outside of preset range.
  - 1. Source: Fume hood manufacturer.
  - 2. Airflow Monitor/Indicator Functionality:
  - 3. Airflow Alarm functionality: Audible (85 dB @ 4 inch (102 mm) distance), and visual alarm that activates when airflow sensor reading is outside of preset range.

- a. Reset and test mode.
- b. Programmable Switch: Designed to silence audible alarm and automatically reset when airflow returns to within preset range. Warning light to stay on when alarm is silenced.
- c. Capability for integration with BAS (Building Automation System) via BACnet.

## 2.7 SOURCE QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Factory testing of each type of fume hood.
- C. Non-Complying Work: See Section 014000.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Locate concealed framing, blocking, and reinforcements that support fume hoods by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- B. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fume hoods.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install fume hoods according to manufacturer's written instructions. Install level, plumb, and true; shim as required, using concealed shims, and securely anchor to building and adjacent laboratory casework. Securely attach access panels but provide for easy removal and secure reattachment. Where fume hoods abut other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Comply with indicated requirements for installing water and laboratory gas service fittings, and electrical and telecommunications devices.

### 3.3 FIELD QUALITY CONTROL

- A. Field test fume hoods as specified below.
  1. General: Test fume hoods as installed to assess airflow velocity. Perform tests with static mode (set sash position) conditions. Conduct testing as outlined below for all hoods provided in the Project.
  2. Preparation:
    - a. Inspect each fume hood to confirm its installation complies with drawings and specifications.
    - b. Inspect laboratory space to verify that construction complies with drawings and specified requirements.
    - c. Do not proceed with fume hood testing until an acceptable TAB report has been received.
    - d. Verify that proper temperature and pressurization of the lab space can be maintained, with door(s) to the space in closed and open positions.
    - e. Adjust non-complying physical and control systems until conditions favorable to testing fume hoods are present.
  3. Operating Conditions Tests:
    - a. Conduct face velocity tests to confirm that target velocities are being achieved within acceptable tolerances.
    - b. Conduct airflow indicator/monitor tests to confirm acceptable variation from corresponding measured value. Calibrate and adjust device to function within specified accuracy parameters.

- c. Conduct exhaust flow and static pressure tests of the HVAC system and its controls to confirm flow volume and static pressures are within acceptable tolerances.
  - d. In projects with VAV lab ventilation systems, conduct response time and stability tests to confirm how the HVAC supply and exhaust systems respond to different sash opening positions.
  - e. Conduct tests of alarm device by shutting off the fume hood exhaust and verify that the individual fume hood alarm activates and operates in specified manner.
  - f. Conduct tests of individual controls provided at the fume hood (such as unoccupied cycle override, alarm override, etc.) to verify they operate in specified manner.
4. Containment Performance Tests:
- a. Conduct airflow visualization tests (local smoke challenges) to provide a visual indication of fume hood's capture performance.
    - 1) Coordinate disabling of local fire alarm system when performing this test.
    - 2) Compensate for smoke discharge velocity and exposure outside of the fume hood.
    - 3) If required to be performed, do not proceed with the large volume challenge test if the hood has failed the local challenge test.
- B. Reporting Requirements: Comply with Section 5 of NEBB Fume Hood Testing (FHT) Standard, current edition. Organize and include, at a minimum, the following information:
- 1. Report title.
  - 2. Report certification.
  - 3. Table of contents.
  - 4. Report summary/ remarks.
  - 5. Appropriate forms.
  - 6. Instrument calibration.
  - 7. List of abbreviations used.
  - 8. A room layout drawing for each tested item. Identify: walls; doors; fume hood(s); other present environmental enclosures (e.g. biological safety cabinet(s), laminar flow hood(s), canopy hood(s), etc.); location and airflow pattern of all air supply, return, and exhaust grilles, registers and diffusers.
- 3.4 ADJUSTING
- A. Adjust moving parts for smooth, near silent, accurate sash operation with one hand only. Adjust sashes for uniform contact of rubber bumpers. Verify that counterbalances operate without interference.
- 3.5 CLEANING
- A. Clean finished surfaces, including both sides of glass; touch up as required; and remove or refinish damaged or soiled areas to match original factory finish, as approved by Engineer.
- 3.6 DEMONSTRATION
- A. Demonstrate proper operation of fume hoods and their accessories to Owner's designated representative.

END OF SECTION

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## SECTION 122413 - ROLLER WINDOW SHADES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Manually operated roller shades with single rollers.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

#### 1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

#### 1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

A. Source Limitations: Obtain roller shades from single source from single manufacturer.

#### 2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Draper Inc.
  2. Hunter Douglas Contract.
  3. MechoShade Systems, Inc. (Basis of Design Product)
- B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
1. Chain-Retainer Type: Clip, jamb mount.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
1. Roller Drive-End Location: Right side of interior face of shade.
  2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. Shadebands:
1. Shade band Material: Light-filtering fabric.
  2. Shade band Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. Color and Finish: As selected by Architect from manufacturer's full range.
- F. Installation Accessories:
1. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
  2. Endcap Covers: To cover exposed endcaps.
  3. Installation Accessories Color and Finish: As selected from manufacturer's full range.

### 2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
1. Source: Roller shade manufacturer.
  2. Type: Woven PVC-coated fiberglass and PVC-coated polyester.
  3. Weave: Mesh.
  4. Thickness: Manufacturers standard.
  5. Roll Width: Varies for windows as window size varies. See drawings.
  6. Color: As selected by Owner from manufacturer's full range.



C. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.

1. Source: Roller shade manufacturer.
2. Owner to select from full range of manufacturer fabrics.

## 2.4 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1

B. As per Basis of Design Product

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

## PART 3 - EXECUTION

### 3.1 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shade bands: Located so shadeband is not closer than 2 inches (51 mm) to interior face of glass. Allow clearances for window operation hardware.

B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

D. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

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**SECTION 123553.19 - WOOD LABORATORY CASEWORK****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Standard and custom wood cabinets and cabinet hardware.
- B. Countertops.
- C. Laboratory sinks.
- D. Pegboards.
- E. Service fittings and outlets.

**1.2 DEFINITIONS**

- A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches (1.066 m) above finished floor, tops of cases less than 72 inches (1.82 m) above finished floor and all members visible in open cases or behind glass doors.
- B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches (1.828 m) above finished floor and bottoms of cabinets more than 30 inches (0.762 m) but less than 42 inches (1.066 m) above finished floor.
- C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches (762 mm) above finished floor.

**1.3 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ANSI A135.4 - Basic Hardboard 2012 (R2020).
- C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015.
- D. ASTM C1036 - Standard Specification for Flat Glass 2016.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
- G. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2017, with Errata (2019).
- H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2016.
- I. SEFA 2 - Installations 2010.
- J. SEFA 3 - Laboratory Work Surfaces 2010.
- K. SEFA 7 - Laboratory Fixtures 2010.
- L. SEFA 8W - Laboratory Grade Wood Casework 2016.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate installation of casework with related items.
  - 1. Service Fixtures: Coordinate location and characteristics of service connections.
  - 2. Equipment and Instruments: Coordinate installation of casework with equipment and scientific instruments.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

**1.5 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Component dimensions, configurations, construction details, joint details, attachments; manufacturer's catalog literature on hardware, accessories, and service fittings, if any.
- C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements placement dimensions and tolerances, clearances required, and utility locations, if any. Include coordinated information for laboratory equipment specified in another section and/or furnished by Owner.
- D. Samples For Color Selection: Wood samples, fully finished, for color and species selection. Minimum Sample Size: 2 inches by 3 inches (51 mm by 75 mm).
- E. Test Reports: From independent laboratory indicating compliance with referenced chemical-resistance standards for cabinet finish and liner materials.
- F. Manufacturer's installation instructions.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- J. Finish touch-up kit for each type and color of materials provided.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.
- B. Acceptance at Site:
  - 1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.
- C. Storage:
  - 1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" paragraph of this section.

#### 1.8 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
  - 1. Ruptured, cracked, or stained finish coating.
  - 2. Discoloration, or lack of finish integrity.
  - 3. Cracking or peeling of finish.
  - 4. Failure of hardware.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Wood Laboratory Casework:
  - 1. Kewaunee Scientific Corp: [www.kewaunee.com](http://www.kewaunee.com).
  - 2. LOC Scientific: [www.locscientific.com](http://www.locscientific.com).
  - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Countertops:
  - 1. Durcon (Epoxy resin, Solid phenolic): [www.durcon.com](http://www.durcon.com).
  - 2. LOC Scientific: [www.locscientific.com](http://www.locscientific.com).
  - 3. Substitutions: See Section 016000 - Product Requirements.
- C. Sinks and Cup Sinks:
  - 1. Durcon (Epoxy resin, Polyolefin): [www.durcon.com](http://www.durcon.com).
  - 2. LOC Scientific: [www.locscientific.com](http://www.locscientific.com).
  - 3. Substitutions: See Section 016000 - Product Requirements.
- D. Obtain casework from single source and manufacturer, unless otherwise indicated.

### 2.2 WOOD LABORATORY CASEWORK

- A. Wood Laboratory Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
  - 1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
  - 2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
    - a. Base Cabinets: 22 inches (559 mm).
    - b. Tall Cabinets: 22 inches (559 mm).
    - c. Upper Cabinets: 16 inches (406 mm).
  - 3. Construction: Joints doweled, glued and screwed, except drawers may be lock-shoulder jointed; with interior of units smooth and flush; cabinet bottom flush with top of face frame; without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
  - 4. Structural Performance: In addition to the requirements of SEFA 3, SEFA 7, and SEFA 8W, components safely support the following minimum loads:
    - a. Base Units: 500 pounds per linear foot (744 kgs/linear m) across the cabinet ends.
    - b. Suspended Units: 300 pounds (136 kg) static load.
    - c. Drawers: 125 pounds (57 kg), minimum.
    - d. Hanging Wall Cases: 300 pounds (135 kg).
    - e. Shelves: 100 pounds (45 kg), minimum.
  - 5. Glazing: Type and thickness standard with manufacturer.
    - a. Framed Doors: Clear Float glass, with gaskets and removable stops; minimize rattling and vibration.
    - b. Frameless Doors: Clear Float glass.
      - 1) Flat polished and chamfered edges.

6. Fittings and Fixture Locations: Cut and drill counter tops, backs, and other components for service outlets and fixtures.
7. Access Panels: Where indicated, for maintenance of utility service and mechanical and electrical components.
8. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.
9. Factory-finish all exposed and semi-exposed surfaces with the same finish.
  - a. Finish Performance: Provide finish on all surfaces having chemical resistance of Level 0 (no change) or Level 1 (slight change of gloss or slight discoloration) according to SEFA 8W and no visible effect when surface is exposed to:
    - 1) Hot water at temperature between 190 degrees F (88 degrees C) and 205 degrees F (96 degrees C) trickled down the test surface at 45 degree angle for 5 minutes.
    - 2) Constant moisture in the form of 2 by 3 by 1 inch (51 by 76 by 25 mm) thick cellulose sponge kept continually saturated with water and in contact with test surface for 100 hours.
  - b. Preparation: Wood sanded smooth, free from dust and mill marks.
  - c. Coating: Clear, superior-quality, chemical-resistant acyclic urethane; applied in accordance with manufacturer instructions, force-dried, sanded and wiped clean.
  - d. Coats: Multiple coats as required to achieve minimum 1.5 mil (0.038 mm) dry film thickness.
  - e. Appearance: Clear satin gloss; not cloudy or muddy.

### 2.3 CABINET HARDWARE

- A. Manufacturer's standard types, styles, and finishes as selected by Owner from Manufacturer's full range.
- B. Finish of exposed stainless steel components: No.4 finish.
- C. Shelves in Cabinets:
  1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.
- D. Swinging Doors:
  1. Hinges: Offset pin, number as required by referenced standards for width, height, and weight of door.
    - a. Butt Hinges for Inset Doors: five-knuckle, projecting barrel, minimum 2-1/2 inches long (five-knuckle, projecting barrel, minimum 64 mm long). Stainless steel with No. 4 finish.
  2. Catches: Magnetic.
  3. Pulls: Chrome wire pulls, 4 inches (102 mm) wide.
  4. Drawers:
    - a. Pulls: Chrome wire pulls, 4 inches (102 mm) wide.
    - b. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

### 2.4 COUNTERTOPS

- A. Countertops:
  1. Epoxy Resin Countertops: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components.
    - a. Flat Surface Thickness: 1 inch (25 mm), nominal.

- b. Surface Finish: Smooth, non-glare.
- c. Color: As selected by Owner from Manufacturer's full range..
- d. Exposed Edge Shape: 1/8 inch (3 mm) bevel chamfer.
- e. Drip Edge: Drip groove 1/8 inch (3 mm) wide and deep, located 1/2 inch (12 mm) back from edge on underside of each exposed edge.
- f. Back and End Splashes: Same material, same thickness; separate for field attachment.
- g. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

## 2.5 SINKS

### A. Laboratory sinks.

- 1. General: Sinks with perimeter lip for drop-in installation.
- 2. Sink Type: Mixing : Single-bowl.
  - a. Material: Epoxy
  - b. Mounting: Drop-in.
  - c. Size: As shown on Drawings.
  - d. Outlet: 1-1/2 inch NPS (40 mm DN) outlet with tailpiece.
- 3. Laboratory Faucets:
  - a. Laboratory Faucets shall have a polished chrome plated finish with clear epoxy coating. Surfaces shall have a minimum coating thickness of 3 mils.
  - b. Type 1 - Sample Faucet
    - 1) Cold Water Faucet, deck mounted with rigid gooseneck.
    - 2) Include anti-splash serration hose end
  - c. Type 2 - Mixing Faucet
    - 1) Hot and Cold Mixing Faucet, deck mounted with rigid gooseneck.

## 2.6 PEGBOARDS

- A. Epoxy pegboards with pre-drilled or punched holes in a staggered pattern, designed to accept removable white polypropylene pegs. With each pegboard include a stainless steel drip-trough with drain outlet and matching diameter 36 inches (914 mm) long PVC drain hose.
  - 1. Size: 30 inches wide by 30 inches high (762 mm wide by 762 mm high).
  - 2. Accessories: Screen insert.

## 2.7 LABORATORY EMERGENCY EQUIPMENT PLUMBING FIXTURES

- A. See Section 224300 for emergency equipment plumbing fixtures not intended for installation in laboratory casework or for recessing into partitions.

## 2.8 MATERIALS

- A. Wood-Based Materials:
  - 1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
  - 2. Composite Wood Panels: Containing no urea-formaldehyde resin binders.
- B. Exposed Solid Wood: Clear, dry, sound, plain sawn, selected for compatible grain and color, no defects.
- C. Exposed Hardwood Plywood: Veneer core; HPVA HP-1 Grade A Type I ; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges

with solid wood of same species as veneer.

- D. Solid Epoxy Resin: Modified epoxy resin and non-asbestos inert fillers cast into sheets.
- E. Glass: Fully tempered float; ASTM C1036, Type 1, Quality Q3; ASTM C1048, tempered using horizontal tempering and complying with ANSI Z97.1; 3/16 inch (4.5 mm) thick minimum; exposed edges ground, and cut or drilled to receive hardware; clear.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Site Verification of Environmental Conditions:
  - 1. Do not deliver casework until the following conditions have been met:
    - a. Building has been enclosed (windows and doors sealed and weather-tight).
    - b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
    - c. Ceiling, overhead ductwork, piping, and lighting have been installed.
    - d. Installation areas do not require further "wet work" construction.
- B. Verify adequacy of support framing and anchors.
- C. Verify that service connections are correctly located and of proper characteristics.

### 3.2 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions and with SEFA 2.
- B. Large Components: Ensure that large components can be moved into final position without damage to other construction.
- C. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.
- D. Set casework items plumb and square, securely anchored to building structure.
  - 1. Base Cabinets: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 3/4 inch (19 mm) leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.
  - 2. Wall Cabinets: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
    - a. Maximum Variation of finished gypsum board surface from true flatness exceeds 1/8 inch in 10 feet (3 mm in 3 m) in any direction.
- E. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
- F. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch ( 1.6 mm). In addition, do not exceed the following tolerances:
  - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch (1.6 mm) in 10 feet (3 m).
  - 2. Variation of Faces of Cabinets from a True Plane: 1/8 inch (3 mm) in 10 feet (3 m).
  - 3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch (0.8 mm).
  - 4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch (1.6 mm).
- G. Secure upper and floor cabinets to concealed reinforcement at gypsum board assemblies.
- H. Service Space Framing: Anchor to floor with two fasteners at each frame. Fasten to wall substrates.



- I. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches (407 mm) on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- J. Wall Cabinets: Fasten to hanging strips, and/or wall substrates. Fasten each cabinet through back, near top, at not less than 16 inches (407 mm) on center.
- K. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- L. Coordinate installation of work of this section with installation of fume hoods and laboratory equipment.
- M. Countertops: Install countertops in one true plane, with ends abutting at hairline joints, and no raised edges.
- N. Replace units that are damaged, including those that have damaged finishes.

### 3.3 ADJUSTING

- A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

### 3.4 CLEANING

- A. Clean casework and other installed surfaces thoroughly.

### 3.5 PROTECTION

- A. Do not permit finished casework to be exposed to continued construction activity.
- B. Protect casework and countertops from ongoing construction activities. Prevent installers from standing on or storing tools and materials on casework or countertops.
- C. Repair damage that occurs prior to Date of Substantial Completion, including finishes, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION