



## Event # 302-10

**Name:** AES Facility Expansion

**Description:** Introduction: This Project is located at 2020 Executive Airport Way, Fort Lauderdale, FL 33309. The work includes, but is not limited to, the renovations and expansion of the Fort Lauderdale Executive Airport (FXE) Aviation Equipment & Service (AES) Facility, including the construction of two new bays, an office space, landscaping, parking improvements, lighting, flooring, and painting.

Drawing Plans: This Project consists of Drawing File No. 4-140-97, 69 sheets. Drawing plans may be obtained free of charge at the City's online strategic sourcing platform.

Licensing Requirements: Florida Certified General Contractor License or any other State or County License(s), Certification(s) or Registration(s) deemed legally permissible by the City to conduct the nature of the work required in this solicitation.

Sub-contractors: Any sub-contractors employed by the Proposer shall be licensed and insured in accordance with this solicitation. Additionally, it is the Proposer's responsibility for ensuring that any sub-contractors' work meets the requirements of this solicitation at all times.

Pre-Bid Meeting/Site Visit: A non-mandatory Pre-Bid Meeting is scheduled for this Event. Please refer to Meetings or the Invitation to Bid (page ITB-2) for more information.

**Buyer:** KENNEDY, DYLAN P.

**Status:** Pending Award

**Event Type:** IFB

**Currency:** USD

**Sealed Bid:** Yes

**Respond To All Lines:** Yes

**Q & A Allowed:** Yes

**Number Of Amendments:** 10

**Display Bid Tabulation:** Do Not Display

## Event Dates

**Preview:**

**Q & A Open:** 09/03/2024 02:00:00 PM

**Open:** 09/03/2024 02:00:00 PM

**Q & A Close:** 09/20/2024 05:00:00 PM

**Close:** 12/20/2024 02:00:00 PM

**Dispute Close:**

## Questions

Question

Response Type

Required Forms: Did you complete the Required Forms Package? Please upload the completed forms here. Yes No

## Event # 302-10: AES Facility Expansion

Question	Response Type
Licensing Requirements: Do you meet the licensing requirements of this solicitation? Please upload supporting documentation here.	Yes No
Experience Required: Do you meet the experience requirements of this solicitation? Please upload supporting documentation here.	Yes No
Insurance Requirements: Do you meet the insurance requirements of this solicitation? Please upload supporting documentation here.	Yes No
Bid Security: Are you aware that this solicitation has a Bid Security requirement? Please refer to the Invitation to Bid (page ITB-1) for more information.	Yes No

### Meetings

Meeting	Description	Location	Date	Required
Pre-Bid Meeting/Site Visit	While attendance is not mandatory, tours at other times might not be available. For more information, please refer to the Invitation to Bid, page ITB-2.	FXE Airport, Admin Building, Red Tail Conference Room	09/11/2024 02:00:00 PM	No

### Attachments

Name	Attachment
Contract and Specifications Package.pdf	Contract and Specifications Package.pdf
Project Manual.pdf	Project Manual.pdf
Required Forms.pdf	Required Forms.pdf
Addendum No. 1 - Addendum Overview.pdf	Addendum No. 1 - Addendum Overview.pdf
Addendum No. 1 - Project Manual, Section 07 54 19.pdf	Addendum No. 1 - Project Manual, Section 07 54 19.pdf
Addendum No. 2 - Addendum Overview.pdf	Addendum No. 2 - Addendum Overview.pdf
Addendum No. 2 - Project Manual.pdf	Addendum No. 2 - Project Manual.pdf
Addendum No. 3 - Addendum Overview.pdf	Addendum No. 3 - Addendum Overview.pdf
Addendum No. 4 - Addendum Overview.pdf	Addendum No. 4 - Addendum Overview.pdf
Addendum No. 5 - Addendum Overview.pdf	Addendum No. 5 - Addendum Overview.pdf
Addendum No. 5 - Plans Request Form.pdf	Addendum No. 5 - Plans Request Form.pdf

## Event # 302-10: AES Facility Expansion

Name	Attachment
Addendum No. 5 – Plans Request Form.pdf	Addendum No. 5 – Plans Request Form.pdf
Addendum No. 6 – Addendum Overview.pdf	Addendum No. 6 – Addendum Overview.pdf
Addendum No. 7 – Addendum Overview.pdf	Addendum No. 7 – Addendum Overview.pdf
Addendum No. 8 – Addendum Overview.pdf	Addendum No. 8 – Addendum Overview.pdf
Addendum No. 9 – Addendum Overview.pdf	Addendum No. 9 – Addendum Overview.pdf
Federal Aviation Administration (FAA) Provisions.pdf	Federal Aviation Administration (FAA) Provisions.pdf
Addendum No. 10 – Addendum Overview.pdf	Addendum No. 10 – Addendum Overview.pdf
Questionnaire Sheet.pdf	Questionnaire Sheet.pdf

### Commodity Codes

Commodity Code	Description
909	BUILDING CONSTRUCTION SERVICES, NEW (INCL. MAINTENANCE AND
909-10	Airport Facility Construction
914	CONSTRUCTION SERVICES, TRADE (NEW CONSTRUCTION)

### Line Details

## Line 1: DIVISION 01 – GENERAL REQUIREMENTS

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 01 - General Requirements contract documents. In addition, lump sum price shall include any administrative items not specifically mentioned in the other divisions included, but not limited to, contractor quality control, contractor staging and storage area, mobilization, project survey (Specification S-101). The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 1      DIVISION 01 – GENERAL REQUIREMENTS

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC

**Division:** DIV

**Quantity:** 1.0000

**Unit of Measure:** LS

## Event # 302-10: AES Facility Expansion

---

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes

**Price Breaks Allowed:** No

**Allow Alternate Responses:** No

**Add On Charges Allowed:** No

### Line 2: DIVISION 03 - CONCRETE

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 03 - Concrete contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 2      DIVISION 03 - CONCRETE

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC

**Division:** DIV

**Quantity:** 1.0000

**Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes

**Price Breaks Allowed:** No

**Allow Alternate Responses:** No

**Add On Charges Allowed:** No

### Line 3: DIVISION 04 - MASONRY

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 04 - Masonry contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 3      DIVISION 04 - MASONRY

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC

**Division:** DIV



## Event # 302-10: AES Facility Expansion

---

**Quantity:** 1.0000

**Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes

**Price Breaks Allowed:** No

**Allow Alternate Responses:** No

**Add On Charges Allowed:** No

### Line 4: DIVISION 05 - METALS

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 05 - Metals contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 4 DIVISION 05 - METALS

**Commodity Code:** 909-10 Airport Facility Construction

**Manufacturer Code:** MFC

**Division:** DIV

**Quantity:** 1.0000

**Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes

**Price Breaks Allowed:** No

**Allow Alternate Responses:** No

**Add On Charges Allowed:** No

### Line 5: DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 06 - Wood, Plastics, and Composites contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 5 DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

**Commodity Code:** 909-10 Airport Facility Construction

## Event # 302-10: AES Facility Expansion

---

**Manufacturer** MFC  
**Code:**

**Division:** DIV

**Quantity:** 1.0000

**Unit of** LS  
**Measure:**

**Requested** 03/29/2025  
**Delivery**  
**Date:**

**Require** Yes  
**Response:**

**Price Breaks** No  
**Allowed:**

**Allow Alternate** No  
**Responses:**

**Add On** No  
**Charges**  
**Allowed:**

### Line 6: DIVISION 07 - THERMAL AND MOISTURE PROTECTION

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 07 - Thermal and Moisture Protection contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 6      DIVISION 07 - THERMAL AND MOISTURE PROTECTION

**Commodity** 909-10      Airport Facility Construction  
**Code:**

**Manufacturer** MFC  
**Code:**

**Division:** DIV

**Quantity:** 1.0000

**Unit of** LS  
**Measure:**

**Requested** 03/29/2025  
**Delivery**  
**Date:**

**Require** Yes  
**Response:**

**Price Breaks** No  
**Allowed:**

**Allow Alternate** No  
**Responses:**

**Add On** No  
**Charges**  
**Allowed:**

### Line 7: DIVISION 08 - OPENINGS

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 08 - Openings contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 7      DIVISION 08 - OPENINGS



## Event # 302-10: AES Facility Expansion

---

**Item:** BASE BID ITEM 9      DIVISION 10 - SPECIALTIES

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC      **Division:** DIV

**Quantity:** 1.0000      **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes      **Price Breaks Allowed:** No      **Allow Alternate Responses:** No

**Add On Charges Allowed:** No

## Line 10: DIVISION 21 - FIRE SUPPRESSION

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 21 - Fire Suppression contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 10      DIVISION 21 - FIRE SUPPRESSION

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC      **Division:** DIV

**Quantity:** 1.0000      **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes      **Price Breaks Allowed:** No      **Allow Alternate Responses:** No

**Add On Charges Allowed:** No

## Line 11: DIVISION 22 - PLUMBING

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 22 - Plumbing contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

## Event # 302-10: AES Facility Expansion

---

**Item:** BASE BID ITEM 11      DIVISION 22 - PLUMBING

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC      **Division:** DIV

**Quantity:** 1.0000      **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes      **Price Breaks Allowed:** No      **Allow Alternate Responses:** No

**Add On Charges Allowed:** No

## Line 12: DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HV)

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 23 - Heating Ventilating and Air Conditioning contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 12      DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HV)

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC      **Division:** DIV

**Quantity:** 1.0000      **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes      **Price Breaks Allowed:** No      **Allow Alternate Responses:** No

**Add On Charges Allowed:** No

## Line 13: DIVISION 26 - ELECTRICAL

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 26 - Electrical contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of

## Event # 302-10: AES Facility Expansion

---

the bid alternatives.

**Item:** BASE BID ITEM 13      DIVISION 26 - ELECTRICAL

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC      **Division:** DIV

**Quantity:** 1.0000      **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes      **Price Breaks Allowed:** No      **Allow Alternate Responses:** No

**Add On Charges Allowed:** No

## Line 14: DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 28 - Electronic Safety and Security contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 14      DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC      **Division:** DIV

**Quantity:** 1.0000      **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes      **Price Breaks Allowed:** No      **Allow Alternate Responses:** No

**Add On Charges Allowed:** No

## Line 15: DIVISION 40 - PROCESS INTERCONNECTIONS

---

## Event # 302-10: AES Facility Expansion

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work that is part of the Division 40 - Process Interconnections contract documents. The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 15      DIVISION 40 - PROCESS INTERCONNECTIONS

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC      **Division:** DIV

**Quantity:** 1.0000      **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes      **Price Breaks Allowed:** No      **Allow Alternate Responses:** No

**Add On Charges Allowed:** No

## Line 16: EXTERIOR IMPROVEMENTS

---

**Description:** The lump sum price shall include all labor, materials, and equipment necessary to complete work outside of the building footprint that is part of the contract documents included, but not limited to, temporary fencing and gates, stripping, excavation, pavement removal, FDOT pavement construction, exterior demolition, removal and installation of concrete sidewalk, removal and installation of stormwater system, removal and installation of water and sewer service installation, bollards, landscaping and sodding, and Airside Operations Area (AOA) Fencing (Specification F-162). The price for this line item shall only be for the base bid and shall not include the price for any of the bid alternatives.

**Item:** BASE BID ITEM 16      EXTERIOR IMPROVEMENTS

**Commodity Code:** 909-10      Airport Facility Construction

**Manufacturer Code:** MFC      **Division:** DIV

**Quantity:** 1.0000      **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes      **Price Breaks Allowed:** No      **Allow Alternate Responses:** No

**Add On Charges** No

## Event # 302-10: AES Facility Expansion

---

**Allowed:**

### Line 17: OFFICE ROOM

---

**Description:** Furnishing and construction of an office room inside the new warehouse expansion including, but not limited to, permits, reflected ceiling, interior painting, new HVAC, flooring, and LED lighting. The lump sum price shall include all labor, materials, equipment, and test and balance of the completely installed and operational system. This bid alternate 1 shall include insurance, bond, overhead and profit, and all other fixed costs. The pricing and construction for the Bid Alternative must comply with the specifications and requirements outlined in the project manual.

**Item:** BID ALTERNATE 1    OFFICE ROOM

**Commodity Code:** 909-10    Airport Facility Construction

**Manufacturer Code:** MFC    **Division:** DIV

**Quantity:** 1.0000    **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes    **Price Breaks Allowed:** No    **Allow Alternate Responses:** No

**Add On Charges Allowed:** No

### Line 18: EXISTING LIGHTING UPGRADE TO LED

---

**Description:** Replacing the existing fluorescent lights in the existing facility to LED lighting fixtures including, but not limited to, removing the existing fluorescent light fixtures and install new LED lighting fixtures inside the building and on the building exterior. The lump sum price shall include all labor, materials, equipment, and test and balance of the completely installed and operational system. This bid alternate 2 shall include insurance, bond, overhead and profit, and all other fixed costs. The pricing and construction for the Bid Alternative must comply with the specifications and requirements outlined in the project manual.

**Item:** BID ALTERNATE 2    EXISTING LIGHTING UPGRADE TO LED

**Commodity Code:** 909-10    Airport Facility Construction

**Manufacturer Code:** MFC    **Division:** DIV

**Quantity:** 1.0000    **Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025



## Event # 302-10: AES Facility Expansion

---

**Date:**

**Require Response:** Yes

**Price Breaks Allowed:** No

**Allow Alternate Responses:** No

**Add On Charges Allowed:** No

### Line 19: RE-PAINT EXISTING FACILITY

---

**Description:** Re-paint the existing AES facility exterior. The lump sum price shall include all labor, materials, equipment, and test and balance of the completely installed and operational system. This bid alternate 3 shall include insurance, bond, overhead and profit, and all other fixed costs. The pricing and construction for the Bid Alternative must comply with the specifications and requirements outlined in the project manual.

**Item:** BID ALTERNATE 3 RE-PAINT EXISTING FACILITY

**Commodity Code:** 909-10 Airport Facility Construction

**Manufacturer Code:** MFC

**Division:** DIV

**Quantity:** 1.0000

**Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes

**Price Breaks Allowed:** No

**Allow Alternate Responses:** No

**Add On Charges Allowed:** No

### Line 20: NEW FLOORING IN EXISTING FACILITY

---

**Description:** Renovating the existing flooring to new flooring including, but not limited to, removal of the existing flooring and installing new floor finishes. The lump sum price shall include all labor, materials, equipment, and test and balance of the completely installed and operational system. This bid alternate 4 shall include insurance, bond, overhead and profit, and all other fixed costs. The pricing and construction for the Bid Alternative must comply with the specifications and requirements outlined in the project manual.

**Item:** BID ALTERNATE 4 NEW FLOORING IN EXISTING FACILITY

**Commodity Code:** 909-10 Airport Facility Construction

**Manufacturer Code:** MFC

**Division:** DIV

Event # 302-10: AES Facility Expansion

---

**Quantity:** 1.0000

**Unit of Measure:** LS

**Requested Delivery Date:** 03/29/2025

**Require Response:** Yes

**Price Breaks Allowed:** No

**Allow Alternate Responses:** No

**Add On Charges Allowed:** No

**CITY OF FORT LAUDERDALE**

**CONTRACT AND SPECIFICATIONS PACKAGE**

---

**ITB EVENT NO. 302**

**PROJECT NO. 12356**

**AES Facility Expansion**



**Dylan Kennedy**  
**Senior Procurement Specialist**  
E-mail: [dkennedy@fortlauderdale.gov](mailto:dkennedy@fortlauderdale.gov)

<u>Description</u>	<u>TABLE OF CONTENTS</u>	<u>Page</u>
<b>I. CONTRACT AND SPECIFICATIONS PACKAGE</b>	INFOR Attachments	
INVITATION TO BID	ITB-1	
INSTRUCTION TO BIDDERS	IB-1	
GENERAL CONDITIONS	GC-1	
SPECIAL CONDITIONS	SC-1	
SUPPLEMENTAL CONDITIONS	SUP-1	
CONSTRUCTION AGREEMENT (SAMPLE)	C-1	
<b>II. PROJECT MANUAL</b>	See INFOR Attachments	
<b>DIVISION 01 – GENERAL REQUIREMENTS</b>		
01 32 16 - CONSTRUCTION SCHEDULES	PM-9	
01 33 00 - SUBMITTALS	PM-13	
01 33 04 - OPERATION AND MAINTENANCE MANUALS	PM-23	
01 41 00 - CODES, REGULATIONS, AND GUIDELINES	PM-33	
01 45 33 - SPECIAL INSPECTIONS AND TESTING PROGRAM	PM-35	
01 65 50 - PRODUCT DELIVERY, STORAGE, AND HANDLING	PM-43	
01 73 20 - OPENINGS AND PENETRATIONS IN CONSTRUCTION	PM-45	
01 74 00 - CLEANING	PM-53	
01 81 10 - WIND AND SEISMIC DESIGN CRITERIA	PM-57	
<b>DIVISION 03 – CONCRETE</b>		
03 09 00 - CONCRETE	PM-61	
03 15 19 - ANCHORAGE TO CONCRETE	PM-75	
<b>DIVISION 04 – MASONRY</b>		
04 01 20 - MASONRY CLEANING	PM-85	
04 05 13 - MASONRY MORTAR AND GROUT	PM-87	
04 05 23 - MASONRY ACCESSORIES	PM-91	
04 05 50 - COLD AND HOT WEATHER MASONRY CONSTRUCTION	PM-95	
04 22 00 - CONCRETE MASONRY	PM-97	
<b>DIVISION 05 – METALS</b>		
05 21 00 - STEEL JOISTS	PM-107	
05 30 00 - METAL DECK	PM-113	
05 50 00 - METAL FABRICATIONS	PM-121	
<b>DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES</b>		
06 10 00 - ROUGH CARPENTRY	PM-137	
<b>DIVISION 07 – THERMAL AND MOISTURE PROTECTION</b>		
07 21 00 - BUILDING INSULATION	PM-145	
07 26 00 - UNDER SLAB VAPOR RETARDER	PM-149	
07 54 25 - FULLY ADHERED TPO ROOFING	PM-151	
07 62 00 - FLASHING AND SHEET METAL	PM-157	
07 92 00 - JOINT SEALANTS	PM-161	

## **DIVISION 08 – OPENINGS**

08 11 13 - HOLLOW METAL (HM) DOORS AND FRAMES.....	PM-171
08 33 23 - OVERHEAD COILING DOORS (CD) .....	PM-181
08 41 13 - LOW-RISE ALUMINUM STOREFRONT .....	PM-185
08 70 00 - FINISH HARDWARE .....	PM-191
08 81 23 - EXTERIOR GLASS AND GLAZING .....	PM-199
08 90 00 - LOUVERS AND VENTS.....	PM-203

## **DIVISION 09 – FINISHES**

09 22 16 - NON-STRUCTURAL METAL FRAMING.....	PM-207
09 24 24 - PORTLAND CEMENT STUCCO.....	PM-211
09 29 00 - GYPSUM BOARD.....	PM-217
09 30 00 - PORCELAIN TILE.....	PM-221
09 51 00 - ACOUSTICAL CEILINGS (ACT) .....	PM-227
09 53 00 - ACOUSTIC SUSPENSION SYSTEM.....	PM-231
09 65 00 - VINYL COMPOSITION TILE FLOORING AND RESILIENT BASE .....	PM-233
09 91 10 - ARCHITECTURAL PAINTING .....	PM-237

## **DIVISION 10 – SPECIALTIES**

10 14 23 - SIGNS.....	PM-249
10 44 00 - FIRE PROTECTION SPECIALTIES.....	PM-251

## **DIVISION 21 – FIRE SUPPRESSION**

21 05 00 - FIRE PROTECTION SYSTEMS.....	PM-253
---	--------

## **DIVISION 22 – PLUMBING**

22 05 03 - PIPE AND PIPE FITTINGS - PLUMBING SYSTEMS.....	PM-261
22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING.....	PM-273
22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT .....	PM-277
22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT .....	PM-283
22 15 00 - GENERAL SERVICE COMPRESSED-AIR SYSTEMS .....	PM-287
22 20 00 - PLUMBING FIXTURES AND EQUIPMENT .....	PM-295

## **DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)**

23 05 13 - COMMON MOTOR REQUIREMENTS FOR PLUMBING [AND HVAC] EQUIPMENT .....	PM-303
23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT.....	PM-309
23 05 53 - IDENTIFICATION FOR HVAC, DUCTWORK, PIPING AND HVAC EQUIPMENT.....	PM-313
23 05 93 - HVAC SYSTEMS - BALANCING AND TESTING.....	PM-317
23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC SYSTEMS .....	PM-321
23 31 00 - HVAC - DUCTWORK.....	PM-327
23 34 00 - HVAC - FANS .....	PM-333
23 74 36 - REFRIGERANT PIPING SYSTEM.....	PM-337
23 80 00 - HVAC - EQUIPMENT.....	PM-341

## **DIVISION 26 – ELECTRICAL**

26 05 00 - ELECTRICAL - BASIC REQUIREMENTS.....	PM-347
26 05 19 - WIRE AND CABLE - 600 VOLT AND BELOW .....	PM-353
26 05 26 - GROUNDING AND BONDING.....	PM-359

26 05 33 - RACEWAYS AND BOXES .....	PM-363
26 24 16 - PANELBOARDS .....	PM-375
26 24 19 - MOTOR CONTROL EQUIPMENT .....	PM-379
26 27 26 - WIRING DEVICES .....	PM-383
26 28 00 - OVERCURRENT AND SHORT CIRCUIT PROTECTIVE DEVICES .....	PM-387
26 28 16 - SAFETY SWITCHES .....	PM-389
26 41 13 - LIGHTNING PROTECTION SYSTEM.....	PM-393
26 43 13 - LOW VOLTAGE SURGE PROTECTION DEVICES (SPD) .....	PM-401
26 50 00 - INTERIOR AND EXTERIOR LIGHTING.....	PM-407

## **DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

28 31 00 - FIRE ALARM SYSTEM.....	PM-417
-----------------------------------	--------

## **DIVISION 40 – PROCESS INTERCONNECTIONS**

40 42 00 - PIPE, DUCT AND EQUIPMENT INSULATION .....	PM-431
--	--------

## **FAA TECHNICAL SPECIFICATIONS**

ITEM F-162 CHAIN-LINK FENCE .....	PM-437
-----------------------------------	--------

## **NON-FAA SUPPLEMENTAL ITEMS**

ITEM S-101 PROJECT SURVEY .....	PM-443
---------------------------------	--------

## **SUPPLEMENTAL APPENDICES**

APPENDIX A - GEOTECHNICAL REPORT.....	PM-446
APPENDIX B - PAVEMENT CORE DATA .....	PM-463
APPENDIX C - SUMMARY OF LABORATORY TESTS RESULTS .....	PM-467
APPENDIX D - BORING LOCATION PLAN; SOIL PROFILES .....	PM-473

<b>III. DRAWINGS</b> .....	See INFOR Attachments
----------------------------	-----------------------

<b>V. REQUIRED FORMS</b> .....	See INFOR Attachments
--------------------------------	-----------------------

**NOTE:** The following documents (Required Forms) are available electronically for completion and **must** be returned with your bid along with your bid security, proof of insurance, and proof of required licenses/certifications.

Affidavit of Compliance with Foreign Entity Laws  
City of Fort Lauderdale Bid/Proposal Certification  
Contractor Payment Method  
Contractor's Certificate of Compliance with Non-Discrimination Provisions of the Contract  
E-Verify Affirmation Statement  
Non-Collusion Statement  
Questionnaire Sheet  
Specific References Form  
Trench Safety

## **INVITATION TO BID**

Sealed bids will be received electronically until **2:00 p.m.**, local time, on **October 4, 2024**, and opened online immediately thereafter for **BID/EVENT NO. 302, PROJECT NO. 12356, AES Facility Expansion**.

Please be advised that effective immediately, and until further notice, all Invitation to Bids, Request for Proposals, Request for Qualifications, and other solicitations led by the City of Fort Lauderdale will be opened electronically via the [City's on-line strategic sourcing platform](#) at the date and time indicated on the solicitation. All openings will be held on the City's on-line strategic sourcing platform.

In the event of any conflict or discrepancy between bid price(s) submitted by bidder electronically into the City's online strategic sourcing platform Unit Price field(s), any other forms or attachments (whether part of the City's solicitation documents or documents created and uploaded by the bidder, or another section/field of the System, the online unit price(s) **inputted** electronically into the System by the bidder shall govern.

Anyone requesting assistance or having further inquiry in this matter must contact the Procurement Specialist indicated in the solicitation, via the Question and Answer (Q&A) forum on the City's online strategic sourcing platform before the Last Day for Questions indicated in the Solicitation.

This Project is located at 2020 Executive Airport Way, Fort Lauderdale, FL 33309. Pursuant to the Project Manual and Drawings, the work includes, but is not limited to, furnish all materials, labor, and equipment to perform all the work to be accomplished under this contract, which includes renovations and expansion of the Fort Lauderdale Executive Airport (FXE) Aviation Equipment & Service (AES) Facility, including the construction of two new bays, an office space, new landscaping and irrigation, parking improvements, LED site lighting, replacement of the existing building flooring, upgrade the existing AES facility's lighting fixtures to a new LED fixtures, and painting of the existing AES (color scheme to be confirmed with FXE). All work to be completed in compliance with current code and regulations, and per drawings and specifications. Provide construction schedule identifying the project timeframe. The itemized lump sum price shall include all labor, materials, and equipment. This base bid shall include insurance, bond, overhead and profit, and all other fixed costs.

### **THE FOLLOWING IS APPLICABLE TO THIS SOLICITATION IF CHECKED:**

- ☒ **LUMP SUM BID** - City shall pay awarded bidder the Contract Price for the performance of work described in this Invitation for Bid. Payment shall be at the lump sum price stated in this Invitation to Bid and/or resultant contract. This price shall be full compensation for all costs, including overhead and profit, associated with completion of all work in full conformity with the requirements as stated or shown, or both, in the contract documents. The cost of any item of work not covered in this solicitation shall still be provided and the cost borne by the contractor. **NO CHANGE ORDERS WILL BE ALLOWED UNLESS IT IS OWNER-DRIVEN AND INITIATED BY THE CITY.**

**Drawing Plans:** This Project consists of Drawing File No. 4-140-97, 69 sheets. Drawing plans may be obtained **free of charge** at the City's online strategic sourcing platform.

**Licensing Requirements:** Possession of a Florida Certified General Contractor License is required for this Project.

**OR**

Any other State or County License(s), Certification(s) or Registration(s) deemed legally permissible by the City to conduct the nature of the work required in this solicitation.

Any sub-contractors employed by the Proposer shall be licensed and insured in accordance with this solicitation. Additionally, it is the Proposer's responsibility for ensuring that any sub-contractors' work meets the requirements of this solicitation at all times.

**NOTE: Payment on this contract will be made by Visa or MasterCard**

**Pre-Bid Meeting/Site visit:** A pre-bid meeting and/or site visit will be held as follows:

**Date:** Wednesday, September 11, 2024

**Time:** 2:00 pm (EST)

**Location:** Fort Lauderdale Executive Airport  
Administration Building  
Red Tail Conference Room  
6000 NW 21st Avenue  
Fort Lauderdale, FL 33309

While attendance is not mandatory, tours at other times might not be available. It is the sole responsibility of the Contractor to become familiar with the scope of the City's requirements and systems prior to submitting a bid. No variation in price or conditions shall be permitted based upon a claim of ignorance. It is strongly suggested that all Bidders attend the pre-bid meeting and/or site visit.

It will be the sole responsibility of the Bidder to attend the pre-bid/site visit to inspect the City's location(s) facilities systems prior to submitting a bid. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the Bidder has familiarized themselves with the nature and extent of the work, equipment, materials, and labor required.

If a person decides to appeal any decision made by the board, agency, or commission with respect to any matter considered at such meeting or hearing, he or she will need a record of the proceedings, and that, for such purpose, he or she may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based.

**Bid Security:** A certified check, cashier's check, bank officer's check or bid bond for **FIVE percent (5%)** of the bid amount, made payable to the City of Fort Lauderdale, Florida, shall accompany each offer.

**Bid Bonds:** Bidders can submit bid bonds **four** different ways:

- 1) Bidders may submit bid bonds **electronically** directly through the City's online strategic sourcing platform using **Surety 2000**.
- 2) Bidders may **upload** their original executed bid bond on the City's online strategic sourcing platform to accompany their electronic bids, and **mail** the original, signed and sealed hard copy to the Finance Department, Procurement Services Division, 101 NE 3rd Avenue, Suite 1650, Fort Lauderdale, Florida 33301-1016, **within five (5) business days** after bid opening, with the company name, bid number and title clearly indicated on the envelope.
- 3) Bidders can **hand deliver** their original, signed, and sealed bid bond to the Finance Department, Procurement Services Division, 101 NE 3rd Avenue, Suite 1650, Fort Lauderdale, Florida 33301-1016, **before the time of bid opening**, with the company name, bid number and title clearly indicated on the envelope.
- 4) Bidders can **mail** their original, signed, and sealed bid bond to the Finance Department, Procurement Services Division, 101 NE 3rd Ave, Suite 1650, Fort Lauderdale, Florida 33301-1016, **before time of bid opening**, with the company name, bid number and title clearly indicated on the envelope. **NOTE: Bond must be received in Procurement and time stamped before bid opening.**



It will be the sole responsibility of the bidder to ensure that its bid is submitted prior to the bid opening date and time listed. **PAPER BID SUBMITTALS WILL NOT BE ACCEPTED. BIDS MUST BE SUBMITTED ELECTRONICALLY VIA THE CITY'S ONLINE STRATEGIC SOURCING PLATFORM.**

**Certified Checks, Cashier's Checks and Bank Drafts:** These **CANNOT** be submitted via the City's online strategic sourcing platform, nor are their images allowed to be uploaded and submitted with your electronic bid. These forms of securities, as well as hard copy bid bonds, must be received on or before the Invitation to Bid (ITB) opening date and time, at the Finance Department, Procurement Services Division, 101 NE 3rd Avenue, Suite 1650, Fort Lauderdale, Florida 33301-1016, with the bid number and title clearly indicated on the envelope.

It is the bidder's sole responsibility to ensure that its bid bond or other bid security is received by the Procurement Services Division before the time of bid opening. Failure to adhere to this requirement may be grounds to consider the bid as non-responsive.

The City of Fort Lauderdale reserves the right to waive any informality in any or all bids and to reject any or all bids.

For information concerning technical specifications, please utilize the Q&A platform provided on the City's online strategic sourcing platform. Questions of a material nature must be received prior to the cut-off date specified in the solicitation. Material changes, if any, to the scope of services or bidding procedures, will only be transmitted by written addendum. **Bidders please note:** No part of your bid can be submitted via FAX. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the bidder has familiarized himself with the nature and extent of the work, equipment, materials, and labor required. The entire bid response must be submitted in accordance with all specifications contained in this solicitation.

Information on bid results and projects currently out to bid can be obtained on the City's website – <https://www.fortlauderdale.gov/government/departments-a-h/finance/procurement-services>. For general inquiries, please call (954) 828-5933.

**[INTENTIONALLY LEFT BLANK]**

## **INSTRUCTIONS TO BIDDERS**

The following instructions are given for the purpose of guiding bidders in properly preparing their bids or proposals. These directions have equal force and weight with the specifications, and strict compliance is required with all of these provisions.

**QUALIFICATIONS OF BIDDERS:** No bid will be accepted from, nor will any contract be awarded to, any person who is in arrears to the City of Fort Lauderdale, upon any debt or contract, or who has defaulted, as surety or otherwise, upon any obligation to the City, or who is deemed irresponsible or unreliable by the City Commission of Fort Lauderdale.

**CONCERNING SUB-CONTRACTORS, SUPPLIERS, AND OTHERS:** The amount of work that is sublet by the Bidder shall be limited by the condition that the Bidder shall, with his own organization, perform at least forty percent (40%) of the total dollar amount of the Work to be performed under the Agreement.

**PERSONAL INVESTIGATION:** Bidders shall satisfy themselves by personal investigation, and by such other means as they may think necessary or desirable, as to the conditions affecting the proposed work and the cost. No information derived from maps, plans, specifications, or from the Engineer or City staff shall relieve the Contractor from any risk or from fulfilling all terms of the contract.

**INCONSISTENCIES:** Any inconsistency between different provisions of the plans, specifications, bid or contract, or any point requiring explanation must be inquired by the bidder, in writing, at least ten (10) days prior to the time set for opening bids. After bids are opened, the bidders shall abide by the decision of the Engineer as to such interpretation.

**ADDENDA AND INTERPRETATIONS:** No interpretations of the meaning of the plans, specifications or other contract documents will be made orally to any bidder. Prospective bidders must request such interpretation in writing as instructed in the bid package. To be considered, such request must be received by the Questions and Answers deadline as indicated in the City's online strategic sourcing platform. Material changes, if any, to the scope of services or bidding procedures will only be transmitted by written addendum. **It is the bidder's responsibility to verify if addenda have been issued in the City's online strategic sourcing platform.** Failure of any bidder to receive any such addenda or interpretation shall not relieve any bidder from any obligation under its bid as submitted. All addenda so issued shall become a part of the contract document. **Bidder** shall verify in the City's online strategic sourcing platform that it has all addenda before submitting a bid.

**LEGAL CONDITIONS:** Bidders are notified to familiarize themselves with the provisions of the laws of the State of Florida relating to hours of labor on municipal work, and with the provisions of the laws of the State of Florida and the Charter and the ordinances of the City of Fort Lauderdale.

**PUBLIC ENTITY CRIMES:** A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, Florida Statutes, for Category Two for a period of thirty-six (36) months from the date of being placed on the convicted vendor list.

**FORMS OF BIDS:** Each bid and its accompanying statements **MUST BE SUBMITTED ELECTRONICALLY, IN GOOD ORDER WITH ALL BLANKS COMPLETED,** and must show the name of the bidder and a statement as to its contents. In the event of any conflict or discrepancy between bid price(s) submitted by bidder electronically into the City's online strategic sourcing platform Unit Price field(s), any other forms or attachments (whether part

of the City's solicitation documents or documents created and uploaded by the bidder, or another section/field of the System, the online unit price(s) **inputted** electronically into the System by the bidder shall govern.

The bid must be signed by one duly authorized to do so, and in case signed by a deputy or subordinate, the principal's properly written authority to such deputy or subordinate must accompany the bid. No bid will be accepted, for any reason whatsoever, which is not submitted to the City as stated above, within the specified time.

**INSURANCE:** Contractor shall provide and shall require all of its sub-contractors to provide, pay for, and maintain in force at all times during the term of the Agreement, such insurance, including Property Insurance (Builder's Risk), Commercial General Liability Insurance, Business Automobile Liability Insurance, Workers' Compensation Insurance, Employer's Liability Insurance, and Umbrella/Excess Liability, as stated below. Such policy or policies shall be issued by companies authorized to do business in the State of Florida and having agents upon whom service of process may be made in the State of Florida.

**BID BOND:** A certified check, cashier's check or bank officer's check made payable to the City of Fort Lauderdale, or a bid bond in favor of the City of Fort Lauderdale shall accompany each bid as evidence of the good faith and responsibility of the bidder. The amount of the check or bond shall be retained by the City as liquidated damages in the event the bidder whose bid is accepted refuses to or fails to enter into a contract for the execution of the work solicited in this Invitation to Bid.

The bid bond or check shall be a guarantee that the successful bidder will promptly execute a contract satisfactory to the City for the work solicited in this Invitation to Bid and furnish good and sufficient bonds.

Following the full execution of a contract for the work solicited in this Invitation to Bid and the successful bidder's provision of good and sufficient bonds, in the event bid security was provided by check, the amount of the bid security accompanying the successful bidder's bid will be refunded to the successful bidder, or in the event bid security was provided by a bond, the bond accompanying the successful bidder's bid will be returned to the successful bidder. In the event the successful bidder fails to enter into, execute, and deliver a contract and furnish the required bonds within ten (10) days after the City provides notice to the successful bidder to deliver the executed contract and the required bonds, the bid bond shall immediately be payable to the City of Fort Lauderdale, or in the case of a check, the City shall retain the amount of the check, as liquidated damages. The City's retention of such amount shall not be construed as a penalty or forfeiture.

**FILLING IN BIDS:** All prices must be electronically submitted in the bid pages, and bids must fully cover all items for which prices are asked and no other. Where more than one person is interested, it is required that all persons interested or their legal representative make all verification and subscribe to the bid. In the event of any conflict or discrepancy between bid price(s) submitted by bidder electronically into the City's online strategic sourcing platform Unit Price field(s), any other forms or attachments (whether part of the City's solicitation documents or documents created and uploaded by the bidder, or another section/field of the System, the online unit price(s) **inputted** electronically into the System by the bidder shall govern.

**PRICES QUOTED:** Deduct any discount offered and quote firm net unit prices. In the case of a discrepancy in computing the amount of the bid, the unit price quoted will govern. All prices quoted shall be F.O.B. destination, freight prepaid (Bidder pays and bears freight charges, Bidder owns goods in transit and files any claims), unless otherwise stated in Special Conditions. Each item must be bid separately. No attempt shall be made to tie any item or items contained in the ITB with any other business with the City.

**BIDS FIRM FOR ACCEPTANCE:** Bidder warrants, by virtue of bidding, that his bid and the prices quoted in his bid will be firm for acceptance by the City for a period of one hundred and twenty (120) days from the date of bid opening unless otherwise stated in the ITB. The City shall award contract within this time period or shall request to the recommended awarded vendor an extension to hold pricing, until products/services have been awarded.

**ADDITIONAL ITEMS OR SERVICES:** The City may require additional items or services of a similar nature, but not specifically listed in the contract. The Contractor agrees to provide such items or services and shall provide the City prices on such additional items or services. If the price(s) offered are not acceptable to the City, and the situation cannot be resolved to the satisfaction of the City, the City reserves the right to procure those items or services from other vendors, or to cancel the contract upon giving the Contractor thirty (30) days written notice.

**DELETION OR MODIFICATION OF SERVICES:** The City reserves the right to delete any portion of the Contract at any time without cause, and if such right is exercised by the City, the total fee shall be reduced in the same ratio as the estimated cost of the work deleted bears to the estimated cost of the work originally planned. If work has already been accomplished on the portion of the Contract to be deleted, the Contractor shall be paid for the deleted portion on the basis of the estimated percentage of completion of such portion.

If the Contractor and the City agree on modifications or revisions to the task elements, after the City has approved work to begin on a particular task or project, and a budget has been established for that task or project, the Contractor will submit a revised cost to the City for approval prior to proceeding with the work.

**TERMINATION FOR UNAPPROPRIATED FUNDS:** The obligation of the City for payment to a Contractor is limited to the availability of funds appropriated in a current fiscal period, and continuation of the contract into a subsequent fiscal period is subject to appropriation of funds, unless otherwise authorized by law.

**CAUSES FOR REJECTION:** No bid will be canvassed, considered or accepted which, in the opinion of the City is informal or unbalanced, or contains inadequate or unreasonable prices for any items. Each item must carry its own proportion of the cost as nearly as is practicable. Any alteration, erasure, interlineation, or failure to specify bids for all items called for in the schedule shall render the bid informal.

**REJECTION OF BIDS:** The City reserves the right to reject any bid if the evidence submitted by the bidder, or if the investigation of such bidder, fails to satisfy the City that such bidder is properly qualified to carry out the obligations and to complete the work contemplated. Any or all bids will be rejected, if there is reason to believe that collusion exists among bidders. A bid will be considered irregular and may be rejected, if it shows serious omissions, alterations in form, additions not called for, conditions or unauthorized alternates, or irregularities of any kind. The City reserves the right to reject any or all bids and to waive such technical errors as may be deemed best for the interests of the City.

**BID PROTEST PROCEDURE:** Any bidder who is not recommended for award of a contract and who alleges a failure by the City to follow the City's procurement ordinance or any applicable law may protest to the Procurement Division – Deputy Director of Finance, by delivering a letter of protest within five (5) days after a Notice of Intent to award is posted on the City's website at the following link: <https://www.fortlauderdale.gov/government/departments-a-h/finance/procurement-services/notices-of-intent-to-award>

The complete protest ordinance may be found on the City's website at the following link: [https://library.municode.com/fl/fort lauderdale/codes/code of ordinances?nodeId=COOR\\_CH2AD\\_ARTVFI\\_DIV2PR\\_S2-182DIREPRAWINAW](https://library.municode.com/fl/fort%20lauderdale/codes/code%20of%20ordinances?nodeId=COOR_CH2AD_ARTVFI_DIV2PR_S2-182DIREPRAWINAW)

**WITHDRAWALS:** Any bidder may, without prejudice to himself, withdraw its bid at any time prior to the expiration of the time during which bids may be submitted. Such request for withdrawal must be in writing and signed in the same manner and by the same person who signed the bid. After expiration of the period for receiving bids, no bids can be withdrawn, modified, or explained.

**CONTRACT:** The bidder to whom award is made shall execute a written contract to do the work and maintain the same in good repair until final acceptance by the proper authorities and shall furnish good and sufficient bonds as specified within ten (10) days after receiving such contract for execution. If the bidder to whom the first award is made fails to enter into a contract as provided, the award may be annulled and the contract let to the

next lowest bidder who is responsive and responsible, and that bidder shall fulfill every stipulation and obligation as if such bidder were the original party to whom award was made.

The contract shall provide that the Contractor agrees to correct any defective or faulty work or material, which may appear within one (1) year after completion of the work and receipt of final payment.

**ENFORCEMENT OF SPECIFICATIONS:** Copies of the specifications will be placed in the hands of all the assistants to the Engineer and Inspectors employed on the Work, who shall enforce each and every requirement of the contract. Such assistants shall have no authority to vary from such requirements.

**DRAWING PLANS:** Drawing plans may be obtained **free of charge** at the City's online strategic sourcing platform.

**SURETY BOND:** The Contractor shall execute and record in the public records of Broward County, Florida, a payment and performance bond in an amount at least equal to the Contract Price with a surety insurer authorized to do business in the State of Florida as surety, ("Bond"), in accordance with Section 255.05, Florida Statutes (2022), as may be amended or revised, as security for the faithful performance and payment of all of the Contractor's obligations under the Contract Documents.

The successful bidder shall furnish a performance and payment bond in compliance with Section 255.05, Florida Statutes (2022), written by a Corporate Surety company, holding a Certificate of Authority from the Secretary of the Treasury of the United States as acceptable sureties on federal bonds, in an amount equal to the total amount payable by the terms of the contract, executed and issued by a Resident Agent licensed by and having an office in the State of Florida, representing such Corporate Surety, conditioned for the due and faithful performance of the work, and providing in addition to all other conditions, that if the Contractor, or his or its subcontractors, fail to duly pay for any labor, materials, or other supplies used or consumed by such Contractor, or his or its subcontractor or subcontractors, in performance of the work contracted to be done, the Surety will pay the same in the amount not exceeding the sum provided in such bonds, together with interest at the rate of fifteen percent (15%) per annum, and that they shall indemnify and hold harmless the City of Fort Lauderdale to the extent of any and all payments in connection with carrying out of the contract, which the City may be required to make under the law.

The Contractor is required at all times to have a valid surety bond in force covering the work being performed. A failure to have such bond in force at any time shall constitute a default on the part of the Contractor. A bond written by a surety, which becomes disqualified to do business in the State of Florida, shall automatically constitute a failure on the part of the Contractor to meet the above requirements.

Such bond shall continue in effect for one (1) year after completion and acceptance of the work with liability equal to at least twenty-five percent (25%) of contract price, or an additional bond shall be conditioned that the Contractor will correct any defective or faulty work or material which appear within one (1) year after completion of the contract, upon notification by the City, except in contracts which are concerned solely with demolition work, in which cases twenty-five percent (25%) liability will not be applicable.

**AUDIT OF CONTRACTOR'S RECORDS:** Upon execution of the Contract, the City reserves the right to conduct any necessary audit of the Contractor's records. Such an audit, or audits, may be conducted by the City or its representatives at any time prior to final payment, or thereafter, for a period up to three (3) years. The City may also require submittal of the records from either the Contractor, the Subcontractor, or both. For the purpose of this Section, records shall include all books of account, supporting documents and papers deemed necessary by the City to assure compliance with the contract provisions.

Failure of the Contractor or Subcontractor to comply with these requirements may result in disqualification or suspension from bidding for future contracts or disapproval as a Subcontractor at the option of the City.

The Contractor shall assure that each of its Subcontractors will provide access to its records pertaining to the project upon request by the City.

PERIODIC ESTIMATE FOR PARTIAL PAYMENT: After the Contractor has submitted a periodic estimate for partial payment, approved and certified by the Public Works Department, the City shall make payment in the manner provided in the Contract Documents and in accordance with Florida's Prompt Payment Act, Section 218, Florida Statutes (2022).

RESERVATION FOR AWARD AND REJECTION OF BIDS: The City reserves the right to accept or reject any or all bids, part of bids, and to waive minor irregularities or variations to specifications contained in bids, and minor irregularities in the bidding process. The City also reserves the right to award the contract on a split order basis, lump sum basis, individual item basis, or such combination as shall best serve the interest of the City. The City reserves the right to make an award to the responsive and responsible bidder whose product or service meets the terms, conditions, and specifications of the ITB and whose bid is considered to best serve the City's interest. In determining the responsiveness of the offer and the responsibility of the Bidder, the following shall be considered when applicable: the ability, capacity and skill of the Bidder to perform as required; whether the Bidder can perform promptly, or within the time specified, without delay or interference; the character, integrity, reputation, judgment, experience and efficiency of the Bidder; the quality of past performance by the Bidder; the previous and existing compliance by the Bidder with related laws and ordinances; the sufficiency of the Bidder's financial resources; the availability, quality and adaptability of the Bidder's supplies or services to the required use; the ability of the Bidder to provide future maintenance, service or parts; the number and scope of conditions attached to the bid. The City reserves the right to include or not include alternate bid items in award.

LOCAL BUSINESS PREFERENCE: Not applicable to this solicitation.

DISADVANTAGED BUSINESS ENTERPRISE PREFERENCE: Not applicable to this solicitation.

DEBARRED OR SUSPENDED BIDDERS OR PROPOSERS: The bidder or proposer certifies, by submission of a response to this solicitation, that neither it nor its principals and subcontractors are presently debarred or suspended by any Federal department or agency.

LOBBYING ACTIVITIES: **ALL CONTRACTORS PLEASE NOTE:** Any contractor submitting a response to this solicitation must comply, if applicable, with City of Fort Lauderdale Ordinance No. C-11-42 & Resolution No. 07-101, Lobbying Activities. Copies of Ordinance No., C-11-42, and Resolution No. 07-101, may be obtained from the City Clerk's Office at 1 East Broward Boulevard, Suite 444, Fort Lauderdale, Florida 33301. The Ordinance may also be viewed on the City's website at <https://www.fortlauderdale.gov/home/showdocument?id=6036>.

DEBARRED OR SUSPENDED BIDDERS OR PROPOSERS: The bidder or proposer certifies, by submission of a response to this solicitation, that neither it nor its principals and subcontractors are presently debarred or suspended by any Federal department or agency.

**[INTENTIONALLY LEFT BLANK]**

## **GENERAL CONDITIONS**

**Unless otherwise modified in the Project's Special Conditions, the following General Conditions shall be part of the Contract:**

**GC - 01 - DEFINITIONS:** The following words and expressions, or pronouns used in their stead, shall wherever they appear in the Contract and the Contract Documents, be construed as follows:

"Addendum" or "Addenda" - shall mean the additional Contract provisions issued in writing, by the Engineer, prior to the receipt of bids.

"Bid" – shall mean the offer or bid of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

"Bidder" – shall mean any person, firm, company, corporation or entity submitting a bid for the Work.

"Bonds" –shall mean bid, performance and payment bonds and other instruments of security, furnished by Contractor and his surety in accordance with the Contract Documents.

"City" – shall mean the City of Fort Lauderdale, Florida, a Florida municipal corporation. In the event the City exercises its regulatory authority as a government body, the exercise of such regulatory authority and the enforcement of any rules, regulations, codes, laws and ordinances shall be deemed to have occurred pursuant to City's authority as a governmental body and shall not be attributable in any manner to the City as a party to this Contract.

"Consultant" – shall mean a person, firm, company, corporation or other entity employed by the City to perform the professional services for the project.

"Contractor" – shall mean the successful Bidder who has been employed by the City to perform the construction and related services for the project.

"Contract Work" - shall mean everything expressed or implied to be required to be furnished and furnished by the Contractor by any one or more of the parts of the Contract Documents referred to in the Contract hereof. In the case of any inconsistency in or between any parts of this Contract, the Project Manager shall determine which shall prevail.

"Design Documents" – shall mean the construction plans and specifications included as part of a Bid Solicitation prepared either by the City or by the Consultant under a separate Agreement with the City.

"Engineer" - shall include the terms "professional engineer" and "licensed engineer" and means a person who is licensed to engage in the practice of engineering under Florida Statute, Chapter 471. An Engineer may be a City employee or a consultant hired by the City.

"Extra Work" - shall mean work other than that required by the Contract.

"Inspector" – shall mean an authorized representative of the City assigned to make necessary inspections of materials furnished by Contractor and of the Work performed by Contractor.

"Notice" - shall mean written notice sent by certified United States mail, return receipt requested, or sent by commercial express carrier with acknowledgement of delivery, or via fax or email, or by hand delivery with a request for a written receipt of acknowledgment of delivery and shall be served upon the Contractor either personally or to its place of business listed in the Bid.

"Owner" - shall mean the City of Fort Lauderdale.



"Project Manager" - shall mean a professional designated by the City to manage the Project under the supervision and direction of the Public Works Director or designee.

"Public Works Director" – shall mean the Public Works Director of the City of Fort Lauderdale.

"Site" - shall mean the area upon or in which the Contractor's operations are carried out and such other areas adjacent thereto as may be designated as such by the Project Manager.

"Sub-contractor" - shall mean any person, firm, company, corporation or other entity, other than employees of the Contractor, who or which contracts with the contractor, to furnish, or actually furnishes labor and materials, or labor and equipment, or labor, materials and equipment at the site.

"Surety" - shall mean any corporation or entity that executes, as Surety, the Contractor's performance and payment bond securing the performance of this Contract.

**GC - 02 - SITE INVESTIGATION AND REPRESENTATION:** The Contractor acknowledges that it has satisfied itself as to the nature and location of the Work under the Contract Documents, the general and local conditions of the Site, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, and roads, field conditions, the type of equipment and facilities needed preliminary to and during the prosecution of the Work and all other matters which can in any way affect the Work or the cost thereof under the Contract Documents.

The Contractor acknowledges that it has conducted extensive tests, examinations and investigations and represents and warrants a thorough familiarization with the nature and extent of the Contract Documents, the Work, locality, soil conditions, moisture conditions and all year-round local weather and climate conditions (past and present), and, in reliance on such tests, examination and investigations conducted by Contractor and the Contractor's experts, has determined that no conditions exist that would in any manner affect the Bid Price and that the project can be completed for the Bid Price submitted.

Any failure by the Contractor to acquaint itself with all the Site conditions shall not relieve Contractor from responsibility for properly estimating the difficulty or cost thereof under the Contract Documents.

**GC - 03 - SUBSTITUTIONS:** If the Contractor desires to use materials and/or products of manufacturer's names different from those specified in the Contract Documents, the Bidder requesting the substitution shall make written application as described herein. The burden of proving the equality of the proposed substitution rests on the Contractor making the request. To be acceptable, the proposed substitution shall meet or exceed all expressed requirements of the Contract Documents and shall be submitted upon the Contractor's letterhead. The following requirements shall be met in order for the substitution to be considered:

1. Requests for substitution shall be accompanied by such technical data, as the party making the request desires to submit. The Project Manager will consider reports from reputable independent testing laboratories, verified experience records from previous users and other written information valid in the circumstances; and
2. Requests for substitution shall completely and clearly indicate in what respects the materials and/or products differ from those indicated in the Contract Documents; and
3. Requests for substitution shall be accompanied by the manufacturer's printed recommendations clearly describing the installation, use and care, as applicable, of the proposed substitutions; and
4. Requests for substitution shall be accompanied by a complete schedule of changes in the Contract Documents, if any, which must be made to permit the use of the proposed substitution.



If a proposed substitution is approved by the Project Manager, an addendum will be issued to prospective bidders not less than three (3) working days prior to the date set for opening of bids. Unless substitutions are received and approved as described above, the successful Bidder shall be responsible for furnishing materials and products in strict accordance with the Contract Documents.

**GC - 04 - CONSTRUCTION RESOURCES:** Contractor shall provide all labor and equipment necessary to complete the installation within a timely manner. Contractor shall provide details as to manpower and equipment to be dedicated to the project in its Work Plan. Contractor is responsible for making arrangements, obtaining and purchasing construction water services if required to complete the work.

**GC - 05 - CONTROL OF THE WORK:** The Project Manager shall have full control and direction of the Work in all respects. The Project Manager and/or his authorized designee(s) shall, at all times, have the right to inspect the Work and materials. The Contractor shall furnish all reasonable facilities for obtaining such information, as the Project Manager may desire respecting the quality of the Work and materials and the manner of conducting the Work. Should the Contractor be permitted to perform night Work, or to vary the period which work is ordinarily carried on in the daytime, he shall give ample notice to the Project Manager so that proper and adequate inspection may be provided. Such Work shall be done only under such regulations as are furnished in writing by the Project Manager, and no extra compensation shall be allowed to the Contractor therefore. In the event of night work, the Contractor shall furnish such light, satisfactory to the Project Manager, as will ensure proper inspection. Nothing herein contained shall relieve the Contractor from compliance with any and all City ordinances relating to noise or Work during prohibited hours.

**GC - 06 - SUB-CONTRACTOR:** The Contractor shall not sublet, in whole or any part of the Work without the written consent and approval of the Project Manager. Within ten (10) days after official notification of starting date, the Contractor must submit in writing, to the Project Manager, a list of all Sub-contractors. No Work shall be done by any sub-contractor until such Sub-contractor has been officially approved by the Project Manager. A sub-contractor not appearing on the original list will not be approved without written request submitted to the Project Manager and approved by the Public Works Director. In all cases, the Contractor shall give his personal attention to the Work of the Sub-contractors and the Sub-contractor is liable to be discharged by the Contractor, at the direction of the Project Manager, for neglect of duty, incompetence or misconduct.

Acceptance of any sub-contractor, other person, or organization by the Project Manager shall not constitute a waiver of any right of Project Manager to reject defective Work or Work not in conformance with the Contract Documents.

Contractor shall be fully responsible for all acts and omissions of its Sub-contractors and of persons and organizations directly or indirectly employed by them and of persons and organizations for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Nothing in the Contract Documents shall create any contractual relationship between City and any sub-contractor or other person or organization having a direct contract with Contractor, nor shall it create any obligation on the part of City to pay or to see to the payment of any moneys due to any sub-contractor or other person, or organization, except as may otherwise be required by law.

**GC - 07 - QUANTITIES:** Contractor recognizes and agrees that the quantities shown on plans and Bid/Price Schedule are estimates only and may vary during actual construction. No change shall be made involving any departure from the general scheme of the Work and that no such change involving a material change in cost, either to the City or Contractor, shall be made, except upon written permission of the City. However, the Project Manager shall have the right to make minor alternations in the line, grade, plan, form or materials of the Work herein contemplated any time before the completion of the same. That if such alterations shall diminish the quantity of the Work to be done, such alterations shall not constitute a claim for damages or anticipated profits. That if such alterations increase the amount of the Work to be done, such increase shall be paid for according to the quantity actually performed and at the unit price or prices stipulated therefore in the Contract. The City shall, in all cases of dispute, determine the amount or quantity of the several kinds of

Work which are to be paid for under this Contract, and shall decide all questions relative to the execution of the same, and such estimates and decisions shall be final and binding.

Any Work not herein specified, which might be fairly implied as included in the Contract, of which the City shall judge, shall be done by the Contractor without extra charge. However, such cost increases shall be authorized either by the Public Works Director or designee, or the City Commission based upon the purchasing threshold amounts provided for in Chapter 2 of the City of Fort Lauderdale's Code of Ordinances.

**GC - 08 - NO ORAL CHANGES:** Except to the extent expressly set forth in the Contract, no change in, or modification, termination or discharge of the Contract in any form whatsoever, shall be valid or enforceable unless it is in writing and signed by the parties charged, therewith or their duly authorized representative.

**GC - 09 - PERMITS AND PROTECTION OF PUBLIC:** Permits on file with the City and/or those permits to be obtained by the Contractor, shall be considered directive in nature, and will be considered a part of this Contract. A copy of all permits shall be given to the City and become part of the Contract Documents. Terms of permits shall be met prior to acceptance of the Work and release of the final payment.

Contractor shall secure all permits and licenses required for completing the Project. Contractor will obtain the necessary State, County, and City construction/work permits if required.

The Contractor shall comply with all applicable Codes, Standards, Specifications, etc. related to all aspects of the Project.

Where there are telephones, light or power poles, water mains, conduits, pipes or drains or other construction, either public or private, in or on the streets or alleys, the Work shall be so conducted that no interruption or delay will be caused in the operation or use of the same. Proper written notice shall be given to all affected parties prior to proceeding with the Work.

The Contractor shall not be permitted to interfere with public travel and convenience by grading or tearing up streets indiscriminately, but the Work of constructing the various items in this contract shall proceed in an orderly, systematic and progressive manner.

**GC - 10 - DISEASE REGULATIONS:** The Contractor shall enforce all sanitary regulations and take all precautions against infectious diseases as the Project Manager may deem necessary. Should any infectious or contagious diseases occur among his employees, he shall arrange for the immediate removal of the employee from the Site and isolation of all persons connected with the Work.

**GC - 11 - CONTRACTOR TO CHECK PLANS, SPECIFICATIONS, AND DATA:** The Contractor shall verify all dimensions, quantities, and details shown on the plans, supplementary drawings, schedules, and shall notify the Project Manager of all errors, omissions, conflicts and discrepancies found therein within three (3) working days of discovery. Failure to discover or correct errors, conflictions, or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory Work, faulty construction, or improper operation resulting therefrom nor from rectifying such condition at its own expense.

**GC - 12 - MATERIALS AND WORKMANSHIP:** All material shall be new, and the workmanship shall, in every respect, be in conformity with approved modern practice and with prevailing standards of performance and quality. In the event of a dispute, the Project Manager's decision shall be final. Wherever the Plans, Specifications, Contract Documents, or the directions of the Project Manager are unclear as to what is permissible and/or fail to note the quality of any Work, that interpretation will be made by the Project Manager, which is in accordance with approved modern practice, to meet the particular requirements of the Contract.

**GC - 13 - SAFEGUARDING MARKS:** The Contractor shall safeguard all points, stakes, grade marks, monuments, and benchmarks made or established on the Work, bear the cost of re-establishing same if disturbed, or bear the entire expense of rectifying Work improperly installed due to not maintaining or

protecting or for removing without authorization, such established points, stakes and marks. The Contractor shall safeguard all existing and known property corners, monuments and marks not related to the Work and, if required, shall bear the cost of having them re-established by a licensed Professional surveyor registered in the State of Florida if disturbed or destroyed during the course of construction.

**GC - 14 - RESTROOM FACILITIES:** Contractor shall provide portable toilet facilities for employee's use at a location within the Work site to be determined by the City.

**GC - 15 - PROGRESS MEETINGS:** Weekly Status meetings will be conducted with representatives from the City and the Contractor. Contractor shall budget time to participate in such meetings. A well-run Project should result in short meetings.

**GC - 16 - ISSUE RESOLUTION:** Should Contractor become engaged in a dispute with a resident or a City employee, the Contractor shall report the situation to the Project Manager immediately. It shall be mandatory that the City participate in any dispute resolution. Failure of Contractor personnel to notify the City shall obligate Contractor to replace the offending employee immediately if requested by the City.

**GC - 17 - CITY SECURITY-CONTRACTOR AND SUBCONTRACTOR EMPLOYEE INFORMATION:** Prior to commencing work, Contractor shall provide to the City a list of all personnel and sub-contractors on site. The list will include the name, address, birth date and driver's license number for all personnel. All personnel and subcontractors on site will have on their person a company photo ID during all stages of the construction. Contractor shall provide standard required personal information per current City procedures.

**GC - 18 - POST-CONSTRUCTION SURVEY:** The Contractor shall provide as-built survey, sealed and signed by a registered surveyor in the State of Florida, as a condition of final payment.

**GC - 19 - KEY PERSONNEL:** Contractor shall provide as part of the Work Plan, resumes for all key project personnel providing supervision and project management functions. Resumes shall include work history and years of experience performing this type of work.

**GC - 20 - EXISTING UTILITY SERVICE:** All existing utility service shall be maintained with a minimum of interruption at the expense of the Contractor.

**GC - 21 - JOB DESCRIPTION SIGNS:** Contractor, at Contractor's expense, shall furnish, erect, and maintain suitable weatherproof signs on jobs over \$100,000 containing the following information:

1. City Seal (in colors)
2. Project or Improvement Number
3. Job Description
4. Estimated Cost
5. Completion Date

Minimum size of sign shall be four feet high, eight feet wide and shall be suitably anchored. The entire sign shall be painted and present a pleasing appearance. Exact location of signs will be determined in the field. Two (2) signs will be required, one at each end of the job. All costs of this work shall be included in other parts of the work.

**GC - 22 - FLORIDA EAST COAST RIGHT-OF-WAY:** Whenever a City contractor is constructing within the Florida East Coast Railway Company's Right-of-Way, it will be mandatory that the contractor carry bodily injury and property damage insurance in amounts satisfactory to the Florida East Coast Company. This insurance requirement shall be verified by the contractor with the Florida East Coast Company prior to commencing work, and maintained during the life of the Contract.

**GC - 23 - ACCIDENTS:** The Contractor shall provide such equipment and facilities as are necessary and/or required, in the case of accidents, for first aide services to be provided to a person who may be injured during the project duration. The Contractor shall also comply with the OSHA requirements as defined in the United States Labor Code 29 CFR 1926.50.

In addition, the Contractor must report immediately to the Project Manager every accident to persons or damage to property, and shall furnish in writing full information, including testimony of witnesses regarding any and all accidents.

**GC - 24 - SAFETY PRECAUTIONS:** Contractor must adhere to the applicable environmental protection guidelines for the duration of a project. If hazardous waste materials are used, detected or generated at any time, the Project Manager must be immediately notified of each and every occurrence. The Contractor shall comply with all codes, ordinances, rules, orders and other legal requirements of public authorities (including OSHA, EPA, DERM, the City, Broward County, State of Florida, and Florida Building Code), which bear on the performance of the Work.

The Contractor shall take the responsibility to ensure that all Work is performed using adequate safeguards, including but not limited to: proper safe rigging, safety nets, fencing, scaffolding, barricades, chain link fencing, railings, barricades, steel plates, safety lights, and ladders that are necessary for the protection of its employees, as well as the public and City employees. All riggings and scaffolding shall be constructed with good sound materials, of adequate dimensions for their intended use, and substantially braced, tied or secured to ensure absolute safety for those required to use it, as well as those in the vicinity. All riggings, scaffolding, platforms, equipment guards, trenching, shoring, ladders and similar actions or equipment shall be OSHA approved, as applicable, and in accordance with all Federal, State and local regulations.

**GC - 25 - DUST PREVENTION:** The Contractor shall, by means of a water spray, or temporary asphalt pavement, take all necessary precautions to prevent or abate a dust nuisance arising from dry weather or Work in an incomplete stage. All costs of this Work shall be included in the cost of other parts of the Work.

Should the Contractor fail to abate a dust nuisance the Project Manager may stop the Work until the issue is resolved to the City's satisfaction.

**GC - 26 - SITE CLEANUP AND RESTORATION:** The Contractor shall remove all debris and unused or discarded materials from the work site daily. Contractor shall clean the work site to remove all directional drilling "Driller's Mud" materials. No "Driller's Mud" residue shall be allowed to remain in the soil or on the surface of the land or vegetation. All debris and drilling materials must be disposed of offsite at an approved location.

The Contractor shall promptly restore all areas disturbed that are outside the Project limits in equal or better condition at no additional cost to the City.

**GC - 27 - COURTEOUS BEHAVIOR AND RESPECT FOR RESIDENTS AND PROPERTY:** The Contractor and its employees, associates and sub-contractors shall maintain courteous behavior at all times and not engage in yelling, loud music, or other such activities. Contractor's employees shall not leave trash or other discarded items at the Work Site, especially on any private property. In the event complaints arise, Contractor shall immediately remove such offending employees from the project if requested to do so by the Project Manager. Contractor's employees shall not trespass on any private property unless necessary to complete the work but with prior permission from the owner.

Contractor shall notify and obtain permission from the residents 24 hours in advance when planning to work within the resident's property. In addition, Contractor shall notify the resident prior to entering their property to perform work or inspect/investigate the work site. Contractor shall not block residents' driveways unnecessarily. Contractor shall not park equipment on landscaped areas when the vehicle is not needed for the current construction activities. Contractor shall be responsible for repair and/or replacement of all

damaged landscaping within 48 hours including repairing vehicle wheel impressions, irrigation systems, lighting systems, structures, or any other items of resident's property. Contractor shall not destroy, damage, remove, or otherwise negatively impact any landscaping within or outside the right-of-way without prior approval from the Project Manager.

**GC - 28 - PLACING BARRICADES AND WARNING LIGHTS:** The Contractor shall furnish and place, at Contractor's own expense, all barricades, warning lights, automatic blinker lights and such devices necessary to properly protect the work and vehicular and pedestrian traffic. Should the Contractor fail to erect or maintain such barricades, warning lights, etc., the Project Manager may, after 24 hours' notice to the Contractor, proceed to have such barricades and warning lights placed and maintained by City or other forces and all costs incurred thereof charged to the Contractor and may be retained by the City from any monies due, or to become due, to the Contractor.

**GC - 29 - TRAFFIC CONTROL:** The Contractor shall coordinate all Work and obtain, through the City's Transportation and Mobility Department, Broward County, Florida Department of Transportation, as applicable, any permits required to detour traffic or close any street before starting to work in the road.

All traffic control devices, flashing lights, signs and barricades shall be maintained in working condition at all times and conform to Manual of Uniform Traffic Control Devices (MUTCD), latest edition.

**GC - 30 - COORDINATION:** The Contractor shall notify all utilities, transportation department, etc., in writing, with a copy to the Project Manager before construction is started and shall coordinate its Work with them. The Contractor shall cooperate with the owners of any underground or overhead utility lines in their removal, construction and rearrangement operations in order that services rendered by these parties will not be unnecessarily interrupted.

The Contractor shall arrange its Work and dispose of its materials so as to not interfere with the operation of other contractors engaged upon adjacent work, and to join its Work to that of others in a proper manner, and to perform its Work in the proper sequence in relation to that of other contractors as may be directed by the Project Manager.

Each Contractor shall be responsible for any damage done by it or its agents to the work performed by another contractor.

**GC - 31 - WATER:** Bulk water used for construction, flushing pipelines, and testing shall be obtained from fire hydrants. Contractor shall make payment for hydrant meter at Treasury Billing Office, 1st Floor, City Hall, 100 N. Andrews Avenue. With the paid receipt, contractor can pick up hydrant meter at the utility location office. No connection shall be made to a fire hydrant without a meter connected.

**GC - 32 - PROHIBITION AGAINST CONTRACTING WITH SCRUTINIZED COMPANIES:** Subject to *Odebrecht Construction, Inc., v. Prasad*, 876 F.Supp.2d 1305 (S.D. Fla. 2012), *affirmed*, *Odebrecht Construction, Inc., v. Secretary, Florida Department of Transportation*, 715 F.3d 1268 (11th Cir. 2013), with regard to the "Cuba Amendment," the Contractor certifies that it is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in Iran Terrorism Sectors List, created pursuant to Section 215.473, Florida Statutes (2024), as may be amended or revised, and that it does not have business operations in Cuba or Syria, as provided in Section 287.135, Florida Statutes (2024), as may be amended or revised. The Contractor certifies that it is not on the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2024), as may be amended or revised, and that it is not engaged in a boycott of Israel. The City may terminate this Agreement at the City's option if the Contractor is found to have submitted a false certification as provided under subsection (5) of Section 287.135, Florida Statutes (2024), as may be amended or revised, or been placed on the Scrutinized Companies with Activities in Sudan List, or been placed on a list created pursuant to Section 215.473, Florida Statutes (2024), as may be amended or revised, relating to scrutinized active business operations in Iran, or been placed on the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes

(2024), as may be amended or revised, or is engaged in a boycott of Israel, or has been engaged in business operations in Cuba or Syria, as defined in Section 287.135, Florida Statutes (2024), as may be amended or revised.

By submitting a bid or response, the company, principals, or owners certify that it is not listed on the Scrutinized Companies with Activities in Sudan List or listed on the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List or is engaged in business operations in Cuba or Syria.

**GC - 33 - USE OF FLORIDA LUMBER TIMBER AND OTHER FOREST PRODUCTS:** In accordance with Florida Statute 255.20 (3), the City specifies that lumber, timber, and other forest products used for this Project shall be produced and manufactured in the State of Florida if such products are available and their price, fitness, and quality are equal. This requirement does not apply to plywood specified for monolithic concrete forms, if the structural or service requirements for timber for a particular job cannot be supplied by native species, or if the construction is financed in whole or in part from federal funds with the requirement that there be no restrictions as to species or place of manufacture.

The Bidder affirms by submitting a bid response to this solicitation that they will comply with section 255.20 (3) Florida Statutes.

**GC - 34 - PUBLIC RECORDS/TRADE SECRETS/COPYRIGHT:** The Proposer's response to the Solicitation is a public record pursuant to Florida law, which is subject to disclosure by the City under the State of Florida Public Records Law, Florida Statutes Chapter 119.07 ("Public Records Law"). The City shall permit public access to all documents, papers, letters or other material submitted in connection with this Solicitation and the Contract to be executed for this Solicitation, subject to the provisions of Chapter 119.07 of the Florida Statutes.

Any language contained in the Bidder's response to the Solicitation purporting to require confidentiality of any portion of the Bidder's response to the Solicitation, except to the extent that certain information is in the City's opinion a Trade Secret pursuant to Florida law, shall be void. If a Bidder submits any documents or other information to the City which the Bidder claims is Trade Secret information and exempt from Florida Statutes Chapter 119.07 ("Public Records Laws"), the Bidder shall clearly designate that it is a Trade Secret and that it is asserting that the document or information is exempt. The Bidder must specifically identify the exemption being claimed under Florida Statutes 119.07. The City shall be the final arbiter of whether any information contained in the Bidder's response to the Solicitation constitutes a Trade Secret. The City's determination of whether an exemption applies shall be final, and the bidder agrees to defend, indemnify, and hold harmless the City and the City's officers, employees, and agent, against any loss or damages incurred by any person or entity as a result of the City's treatment of records as public records. In addition, the bidder agrees to defend, indemnify, and hold harmless the City and the City's officers, employees, and agents, against any loss or damages incurred by any person or entity as a result of the City's treatment of records as exempt from disclosure or confidential. Bids purporting to be subject to copyright protection in full or in part will be rejected. The bidder authorizes the City to publish, copy, and reproduce any and all documents submitted to the City bearing copyright symbols or otherwise purporting to be subject to copyright protection.

EXCEPT FOR CLEARLY MARKED PORTIONS THAT ARE BONA FIDE TRADE SECRETS PURSUANT TO FLORIDA LAW, DO NOT MARK YOUR RESPONSE TO THE SOLICITATION AS PROPRIETARY OR CONFIDENTIAL. DO NOT MARK YOUR RESPONSE TO THE SOLICITATION OR ANY PART THEREOF AS COPYRIGHTED.

**IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES (2022), TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT:**

**Telephone Number:** (954) 828-5002

**Mailing Address:** City Clerk's Office  
1 East Broward Boulevard, Suite 444,  
Fort Lauderdale, FL 33301

**E-mail:** [prcontract@fortlauderdale.gov](mailto:prcontract@fortlauderdale.gov)

**Contractor shall:**

1. Keep and maintain public records required by the City in order to perform the service.
2. Upon request from the City's custodian of public records, provide the City with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes (2022), as may be amended or revised, or as otherwise provided by law.
3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of this Agreement if the Contractor does not transfer the records to the City.
4. Upon completion of the Agreement, transfer, at no cost, to the City all public records in possession of the Contractor or keep and maintain public records required by the City to perform the service. If the Contractor transfers all public records to the City upon completion of this Agreement, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of this Agreement, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City.

**[INTENTIONALLY LEFT BLANK]**

## **SPECIAL CONDITIONS**

### **01. PURPOSE**

The City of Fort Lauderdale, Florida (City) is seeking bids from qualified, experienced, and licensed firm(s), hereinafter referred to as the Contractor, Bidder, or Proposer, to provide construction services for the Fort Lauderdale Executive Airport (FXE), in accordance with the terms, conditions, and specifications contained in this Invitation to Bid (ITB).

This Project is located at 2020 Executive Airport Way, Fort Lauderdale, FL 33309. Pursuant to the Project Manual and Drawings, the work includes, but is not limited to, furnish all materials, labor, and equipment to perform all the work to be accomplished under this contract, which includes renovations and expansion of the Fort Lauderdale Executive Airport (FXE) Aviation Equipment & Service (AES) Facility, including the construction of a two new bays and office space, new landscaping and irrigation, parking improvements, LED site lighting, replacement of the existing building flooring, upgrade the existing AES facility's lighting fixtures to a new LED fixtures, and painting of the existing AES (color scheme to be confirmed with FXE). All work to be completed in compliance with current code and regulations, and per drawings and specifications. Provide construction schedule identifying the project timeframe. The itemized lump sum price shall include all labor, materials, and equipment. This base bid shall include insurance, bond, overhead and profit, and all other fixed costs.

### **02. TRANSACTION FEES**

The City uses the [City's on-line strategic sourcing platform](#) to distribute and receive bids and proposals. There is no charge to vendors/contractors to register and participate in the solicitation process, nor will any fees be charged to the awarded contractor.

### **03. SUBMISSION OF BIDS**

It is the sole responsibility of the Contractor to ensure that its bid is submitted electronically through the [City's on-line strategic sourcing platform](#), and that any bid security reaches the City of Fort Lauderdale, Procurement Services Division, 101 NE 3rd Avenue, Suite 1650, Fort Lauderdale, Florida 33301-1016, in a sealed envelope marked on the outside with the ITB solicitation number and Contractor's name, no later than the time and date specified in this solicitation. **PAPER BID SUBMITTALS WILL NOT BE ACCEPTED. PLEASE SUBMIT YOUR BID RESPONSE ELECTRONICALLY.** In the event of any conflict or discrepancy between bid price(s) submitted by bidder electronically into the City's online strategic sourcing platform Unit Price field(s), any other forms or attachments (whether part of the City's solicitation documents or documents created and uploaded by the bidder, or another section/field of the System, the online unit price(s) **inputted** electronically into the System by the bidder shall govern.

### **04. INFORMATION OR CLARIFICATION**

For information concerning procedures for responding to this solicitation, contact Dylan Kennedy, **Senior Procurement Specialist**, at [dkennedy@fortlauderdale.gov](mailto:dkennedy@fortlauderdale.gov). Such contact shall be for clarification purposes only.

For information concerning technical specifications, please utilize the question and answer feature (referred to as the Q and A Forum) provided within [INFOR](#). Questions of a material nature must be received prior to the cut-off date specified in the solicitation. Material changes, if any, to the scope of services or bidding procedures will only be transmitted by written addendum. **Contractors please note:** Bids shall be submitted as stated in Part IV – Submittal Requirements. No part of your proposal can be submitted via FAX. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the Bidder has familiarized themselves with the nature and extent of the work, and the equipment, materials, and labor required. The entire bid response



must be submitted in accordance with all specifications contained in this solicitation. The questions and answers submitted in [INFOR](#) shall become part of any contract that is created from this ITB.

## **05. CONTRACT TIME**

- 5.1 The Contractor recognizes that TIME IS OF THE ESSENCE. The Work shall commence within **ten (10)** calendar days of the date of the Notice to Proceed.
- 5.2 The Work shall be Substantially Completed within **two hundred sixty (260)** calendar days after the date when the Contract Time commences to run as provided in the Notice to Proceed.
- 5.3 The Work shall be finally completed on the Final Completion Date and ready for final payment in accordance with this Agreement within **three hundred five (305)** calendar days after the date of the Contract Time commences to run as provided in the Notice to Proceed.

## **06. BID SECURITY**

A certified check, cashier's check, bank officer's check or bid bond for **five percent (5%)** of the bid amount, made payable to the City of Fort Lauderdale, shall accompany each offer.

## **07. REQUIRED LICENSES/CERTIFICATIONS**

Contractor must possess the following licenses/certifications to be considered for award:

Florida Certified General Contractor License

OR

Any other State or County License(s), Certification(s) or Registration(s) deemed legally permissible by the City to conduct the nature of the work required in this solicitation.

Any sub-contractors employed by the Proposer shall be licensed and insured in accordance with this solicitation. Additionally, it is the Proposer's responsibility for ensuring that any sub-contractors' work meets the requirements of this solicitation at all times.

**Note: Contractor must have proper licensing and shall submit evidence of same with its bid response.**

## **08. SPECIFIC EXPERIENCE REQUIRED**

The following expertise is required to be considered for this Contract. Specific references attesting to this expertise must be submitted with the bid response.

Prime Contractor shall have previous construction experience in constructing additions/modifications to existing public buildings in the State of Florida within the last ten (10) years. Bidder shall submit proof of having successfully constructed a minimum of three (3) projects of similar scope and scale (or larger) and shall, for each project listed, identify: location; dates of construction; project name and overall scope; scope of work that was self-performed by Contractor; and the client's name, address, telephone number and e-mail address.

**NOTE: REFERENCES SHALL NOT INCLUDE ONLY CITY OF FORT LAUDERDALE EMPLOYEES OR WORK PERFORMED FOR THE CITY. THE CITY IS ALSO INTERESTED IN WORK EXPERIENCE AND REFERENCES FROM ENTITIES OTHER THAN THE CITY OF FORT LAUDERDALE.**

***By signing this bid solicitation, contractor is affirming that this expertise will be provided for this Contract at no additional charge.***

## 09. BID ALLOWANCE

**Allowance for permits:** Payments will be made to the contractor based on the actual cost of permits upon submission of paid permit receipts. The City shall not pay for other costs related to obtaining or securing permits.

The amount indicated is intended to be sufficient to cover the entire Project. If the City's permit fees exceed the allowance indicated, the City will reimburse the contractor the actual amount of the City's permit fees required for project completion.

Allowance(s)	Amount(s)
Permit fee allowance	\$80,000.00
<b>TOTAL</b>	<b>\$80,000.00</b>

## 10. INSURANCE REQUIREMENTS *(See Article 10, Bonds and Insurance, of the Contract for details)*

### INSURANCE

As a condition precedent to the effectiveness of this Agreement, during the term of this Agreement and during any renewal or extension term of this Agreement, OBTLIC shall cause the OB Contractor, at its sole expense, to provide insurance of such types and with such terms and limits as noted below. Providing proof of and maintaining adequate insurance coverage are material obligations of Contractor. Contractor shall provide the City a certificate of insurance evidencing such coverage. Contractor's insurance coverage shall be primary insurance for all applicable policies, in respect to the City's interests. The limits of coverage under each policy maintained by Contractor shall not be interpreted as limiting Contractor's liability and obligations under this Agreement. All insurance policies shall be through insurers authorized or eligible to write policies in the State of Florida and possess an A.M. Best rating of A-, VII or better, subject to approval by the City's Risk Manager.

The coverages, limits, and/or endorsements required herein protect the interests of the City, and these coverages, limits, and/or endorsements shall in no way be relied upon by Contractor for assessing the extent or determining appropriate types and limits of coverage to protect Contractor against any loss exposures, whether as a result of this Agreement or otherwise. The requirements contained herein, as well as the City's review or acknowledgement, are not intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by Contractor under this Agreement.

The following insurance policies and coverages are required:

#### Commercial General Liability

Coverage must be afforded under a Commercial General Liability policy with limits not less than:

- \$1,000,000 each occurrence and \$2,000,000 aggregate for Bodily Injury, Property Damage, and Personal and Advertising Injury
- \$1,000,000 each occurrence and \$2,000,000 aggregate for Products and Completed Operations

Policy must include coverage for contractual liability and independent contractors.

The City, a Florida municipality, its officials, employees, and volunteers are to be included as an additional insured with a CG 20 26 04 13 Additional Insured – Designated Person or Organization Endorsement or similar endorsement providing equal or broader Additional Insured Coverage with respect to liability arising out of activities performed by or on behalf of Contractor. The coverage shall contain no special limitation on the scope of protection afforded to the City, its officials, employees, and volunteers.

#### Pollution and Remediation Legal Liability (Hazardous Materials)

For the purpose of this section, the term “hazardous materials” includes all materials and substances that are designated or defined as hazardous by Florida or federal law or by the rules or regulations of Florida or any federal agency. If work being performed involves hazardous materials, Contractor shall procure and maintain any or all of the following coverages (which will be specifically addressed upon review of exposure):

#### Contractors Pollution Liability Coverage

For sudden and gradual occurrences and in an amount not less than \$1,000,000 per claim arising out of this Agreement, including but not limited to, all hazardous materials identified under the Agreement.

#### Business Automobile Liability

Coverage must be afforded for all Owned, Hired, Scheduled, and Non-Owned vehicles for Bodily Injury and Property Damage in an amount not less than \$1,000,000 combined single limit each accident.

If Contractor does not own vehicles, Contractor shall maintain coverage for Hired and Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Liability policy.

#### Crane and Rigging Liability (if applicable to work being completed under this contract)

Coverage must be afforded for any crane operations under the Commercial General or Business Automobile Liability policy as necessary, in line with the limits of the associated policy

#### Workers' Compensation and Employer's Liability

Coverage must be afforded per Chapter 440, Florida Statutes. Any person or entity performing work for or on behalf of the City must provide Workers' Compensation insurance. Exceptions and exemptions will be allowed by the City's Risk Manager, if they are in accordance with Florida Statute.

Contractor waives, and Contractor shall ensure that Contractor's insurance carrier waives, all subrogation rights against the City, its officials, employees, and volunteers for all losses or damages. The City requires the policy to be endorsed with WC 00 03 13 Waiver of our Right to Recover from Others or equivalent.

Contractor must be in compliance with all applicable State and federal workers' compensation laws, including the U.S. Longshore and Harbor Workers' Compensation Act and the Jones Act, if applicable.

#### Insurance Certificate Requirements

- a. Contractor shall provide the City with valid Certificates of Insurance (binders are unacceptable) no later than ten (10) days prior to the start of work contemplated in this Agreement.
- b. Contractor shall provide to the City a Certificate of Insurance having a thirty (30) day notice of cancellation; ten (10) days' notice if cancellation is for nonpayment of premium.
- c. In the event that the insurer is unable to accommodate the cancellation notice requirement, it shall be the responsibility of Contractor to provide the proper notice. Such notification will be in writing by registered mail, return receipt requested, and addressed to the certificate holder.
- d. In the event the Agreement term or any surviving obligation of Contractor following expiration or early termination of the Agreement goes beyond the expiration date of the insurance policy, Contractor shall provide the City with an updated Certificate of Insurance no later than ten (10) days prior to the expiration of the insurance currently in effect. The City reserves the right to suspend the Agreement until this requirement is met.
- e. The Certificate of Insurance shall indicate whether coverage is provided under a claims-made or occurrence form. If any coverage is provided on a claims-made form, the Certificate of Insurance must show a retroactive date, which shall be the effective date of the initial contract or prior.
- f. The City shall be included as an Additional Insured on all liability policies, with the exception of Workers' Compensation.

- g. The City shall be granted a Waiver of Subrogation on Contractor's Workers' Compensation insurance policy.
- h. The title of the Agreement, Bid/Contract number, event dates, or other identifying reference must be listed on the Certificate of Insurance.

The Certificate Holder should read as follows:

City of Fort Lauderdale  
401 SE 21<sup>st</sup> Street  
Fort Lauderdale, FL 33316

Contractor has the sole responsibility for all insurance premiums and shall be fully and solely responsible for any costs or expenses as a result of a coverage deductible, co-insurance penalty, or self-insured retention; including any loss not covered because of the application of such deductible, co-insurance penalty, self-insured retention, or coverage exclusion or limitation. Any costs for adding the City as an Additional Insured shall be at Contractor's expense.

If Contractor's primary insurance policy/policies do not meet the minimum requirements as set forth in this Agreement, Contractor may provide evidence of an Umbrella/Excess insurance policy to comply with this requirement.

Contractor's insurance coverage shall be primary insurance in respect to the City's interests, a Florida municipality, its officials, employees, and volunteers. Any insurance or self-insurance maintained by the City shall be non-contributory.

Any exclusion or provision in any insurance policy maintained by Contractor that excludes coverage required in this Agreement shall be deemed unacceptable and shall be considered breach of contract.

All required insurance policies must be maintained until the Agreement work has been accepted by the City, or until this Agreement is terminated, whichever is later. Any lapse in coverage may be considered breach of contract. In addition, Contractor must provide to the City confirmation of coverage renewal via an updated certificate of insurance should any policies expire prior to the expiration of this Agreement. The City reserves the right to review, at any time, coverage forms and limits of Contractor's insurance policies.

Contractor shall provide notice of any and all claims, accidents, and any other occurrences associated with this Agreement to Contractor's insurance company or companies and the City's Risk Management office as soon as practical.

It is Contractor's responsibility to ensure that any and all of Contractor's independent contractors and subcontractors comply with these insurance requirements. All coverages for independent contractors and subcontractors shall be subject to all of the applicable requirements stated herein. Any and all deficiencies are the responsibility of Contractor. The City reserves the right to adjust insurance limits from time to time at its discretion with notice to Contractor.

**NOTE:** CITY PROJECT NUMBER, PROJECT NAME AND BID NUMBER MUST APPEAR ON EACH CERTIFICATE, AND THE CITY OF FORT LAUDERDALE MUST BE NAMED ON THE CERTIFICATE AS AN "ADDITIONAL INSURED" ON REQUIRED LIABILITY POLICIES.

**A Sample Insurance Certificate** shall be included with the bid to demonstrate the firm's ability to comply with insurance requirements. Provide a previous certificate or other evidence listing the insurance companies' names for all required coverage, and the dollar amounts of the coverage.

**11. PERFORMANCE AND PAYMENT BOND: 100%**

**12. CITY PROJECT MANAGER**

The Project Manager is hereby designated by the City as Khant Myat, P.E., whose address is 6000 NW 21<sup>ST</sup> Avenue, Fort Lauderdale, FL 33309, telephone number: (954) 828-5061, and email address is [kmyat@fortlauderdale.gov](mailto:kmyat@fortlauderdale.gov). The Project Manager will assume all duties and responsibilities and will have the rights and authorities assigned to the Project Manager in the Contract Documents in connection with completion of the Work in accordance with this Agreement.

**13. LIQUIDATED DAMAGES** *(See Article 16, Liquidated Damages, of the Contract for details)*

Upon failure of the Contractor to complete the Work within the time specified for completion, the Contractor shall pay to the City the sum of **Two Hundred Fifty (\$250.00)** for each and every calendar day that the completion of the Work is delayed beyond the time specified in this Agreement for completion, as fixed and agreed liquidated damages and not as a penalty, so long as the delay is caused by the Contractor.

**14. PAYMENT** *(See Article 7, Payment, of the Contract for other details)*

The City shall make payment to the Contractor through utilization of the City's P-Card Program. The City has implemented a Purchasing Card (P-Card) Program utilizing both the VISA and MASTERCARD networks. Purchases from this contract will be made utilizing the City's Purchasing Card. Contractor will receive payment from the purchasing card in the same manner as other credit card purchases. Accordingly, Contractor must presently have the ability to accept these credit cards or take whatever steps necessary to implement the ability before the start of the contract term, or contract award by the City. All costs associated with the Contractor's participation in this purchasing program shall be borne by the Contractor. The City reserves the right to revise this program as necessary.

Payment Card Industry (PCI) Compliance

Contractor agrees to comply with all applicable state, federal and international laws, as well as industry best practices, governing the collection, access, use, disclosure, safeguarding and destruction of Protected Information.

Contractor and/or any subcontractor that handles credit card data must be, and remain, PCI compliant under the current standards and will provide documentation confirming compliance upon request by the City of Fort Lauderdale, failure to produce documentation could result in termination of the contract.

**15. WORK SCHEDULE (including overtime hours):**

Regular work hours: **8:00 am to 4:30 pm, Monday through Friday.**

City Inspector Hours: **8:00 am to 4:30 pm, Monday through Friday.**

Any inspection requested by the contractor outside those hours will be considered overtime to be paid by the Contractor.

**16. INSPECTION OVERTIME COST: \$100/hr.**

# **Supplemental Conditions**

**[THIS PAGE INTENTIONALLY LEFT BLANK]**

**SECTION 011000  
SUMMARY****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 INTENT OF DRAWINGS AND SPECIFICATIONS**

- A. Intent of the drawings and specifications is to cover an installation complete in every respect. It is not necessarily intended to provide every detail on drawings or in the specifications. The City will not be responsible for absence of any detail which the Contractor may require nor for any special construction which may be found necessary as work progresses. If an item is either indicated or specified, it shall be considered sufficient for inclusion of said item in the contract. Contractor shall furnish and install materials and equipment normally furnished with such systems and as needed to complete a fully operational installation, whether mentioned or not, which are customary to the trade.
- B. Incidental accessories not usually shown or specified, but which are necessary for the proper installation and operation shall be included in the work without additional cost to the City, as if herein depicted or specified.
- C. Any apparatus, appliance, material or work not shown on drawings, but mentioned in specifications, or vice versa, shall be furnished, delivered and installed by the Contractor without additional cost to the City.
- D. Drawings are diagrammatic and indicate the general arrangement of systems and work indicated (do not scale drawings). Consult the Project Manager for exact locations of fixtures, furniture, and equipment, etc. where these items are not definitively located on the drawings.

**1.3 PROJECT INFORMATION**

- A. Project Identification: P 12356
- B. Project Location: 2020 Executive Airport Way
- C. Owner: City of Fort Lauderdale
  - 1. City's Representative: Khant Myat, P.E., Airport Engineer - FXE
- D. Engineering Consultant/Construction Manager:
  - 1. Cody Parham, P.E., Project Manager, HDR Engineering Inc



## 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work is defined by the Contract Documents and consists of the following:
1. The building includes, but is not limited to, concrete, masonry, steel, metal, carpentry, thermal and moisture protection, openings, finishes, signs, fire protection, fire suppression, plumbing, heating ventilating and air conditioning, electrical safety and security.
  2. Site work includes, but is not limited to, clearing and grubbing, demolition or relocation of the utilities, grading, sodding, landscaping, site demolition, piping, storm water system, sanitary sewer system, fire protection and domestic water piping and connections, asphalt and structural concrete paving, concrete walks and site lighting & signalization.
- B. TYPE OF CONTRACT
1. Project will be constructed under a single prime contract.
    - a. Division of work: The division of work among its separate Subcontractors is the responsibility of the General Contractor, and the City assumes no responsibility to act as arbitrator to establish subcontract limits between any sections of the work.

## 1.5 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Concurrent Work: City 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. Access control system.
  2. Fire Department alerting system.
  3. Wiring for IT and radio equipment. S

## 1.6 USE OF PREMISES

- A. General: Contractor shall have full use of project site for construction operations during construction period. Contractor's use of project site is limited only by City's right to perform work or to retain other contractors on portions of Project.
- a. Limit site disturbance, including earthwork and clearing of vegetation, to **40 feet (12.2 m)** beyond building perimeter; **10 feet (3 m)** beyond surface walkways, patios, surface parking, and utilities less than **12 inches (300 mm)** in diameter; **15 feet (4.5 m)** beyond primary roadway curbs and main utility branch trenches; and **25 feet (7.6 m)** beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.

2. City Occupancy: Allow for City occupancy of Project site.

## 1.7 CITY'S OCCUPANCY REQUIREMENTS

- A. City Limited Occupancy of Completed Areas of Construction: City reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
  1. Contractor will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before City occupancy.
  2. Obtain a Certificate of Occupancy from City Construction Services Department. Deliver signed copy to City Representative.
  3. Before partial City occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, City will operate and maintain mechanical and electrical systems serving occupied portions of building.
  4. On occupancy, City will assume responsibility for maintenance and custodial service for occupied portions of building.

## 1.8 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
  1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
  2. All personnel or equipment shall be located inside the designated work area. Any person that enter the airfield without prior approval will be terminated from working on this project.
- B. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to neighbors.
  1. Notify project Manager, Construction Manager, and the City not less than two days in advance of proposed disruptive operations.
  2. Obtain the Fort Lauderdale Executive Airport written permission before proceeding with disruptive operations.
- C. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor air intakes.
- D. Controlled Substances: Use of tobacco products and other controlled substances the Project site is not permitted.

## 1.9 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 49-division format and CSI/CSC's "MasterFormat" numbering system.
  1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric

sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

- a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

## **1.10 MISCELLANEOUS PROVISIONS**

### **PART 2 - PRODUCTS (Not Used)**

### **PART 3 - EXECUTION (Not Used)**

## **END OF SECTION 011000**

**SECTION 012900  
PAYMENT PROCEDURES**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
  - 1. Division 01 Section "Allowances" for procedural requirements governing handling and processing of allowances.
  - 2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 3. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices.
  - 4. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.
  - 5. .

**1.3 DEFINITIONS**

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

**1.4 SCHEDULE OF VALUES**

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
  - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
    - a. City's Form - Periodic Estimate for Partial Payment.
    - b. Submittals Schedule.
    - c. Contractor's Construction Schedule.
  - 2. Submit the Schedule of Values to City Representative at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of

payment.

- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
    - a. Project name and location.
    - b. Project Number
    - c. Contractor's name and address.
    - d. Date of submittal.
  2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or Division.
    - b. Description of the Work.
    - c. Name of subcontractor.
    - d. Name of manufacturer or fabricator.
    - e. Name of supplier.
    - f. Change Orders (numbers) that affect value.
    - g. Dollar value.
      - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
  3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
  4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
  6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
  8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as General Conditions expense, at Contractor's option.
9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

## 1.5 APPLICATIONS FOR PAYMENT

- A. The General Contractor must meet with the City Representative on or about the 25th of each month. The City Representative will go over the pay items and agree on the quantities and the dollar amounts of the work completed during the month. A copy of the agreed amounts will be signed by the parties and a copy will be left with each representative.
- B. The General Contractor will make up a partial pay request using the City-supplied forms and submit the request to the City Representative before the first of the upcoming month.
- C. Each pay request must be accompanied by a partial release of lien by the General Contractor and by all Subcontractors, suppliers, and for all labor, as outlined below.
  1. Starting with the second (2nd) pay request and for each and every pay request thereafter, the General Contractor shall submit partial release of liens from all Subcontractors, suppliers, and laborers covering the preceding month's request (SEE FOLLOWING EXAMPLE).
  2. EXAMPLE: In the first (1st) pay request, payment is requested by General Contractor for the asbestos contractor and the electrician. The General Contractor must attach his partial release of lien.
  3. For the second (2nd) pay request, the General Contractor must attach his partial release of lien from the asbestos contractor and the electrician for the amounts billed in the 1st pay request; i.e., the General Contractor will be running one (1) month behind with the releases from the Subcontractors, suppliers, etc., until the final pay request.
  4. Progress photo of the construction site from aerial and ground.
- D. For the final pay request, the General Contractor will be required to submit FINAL release of liens for ALL Subcontractors, suppliers, etc., and for ALL labor BEFORE FINAL PAYMENT WILL BE MADE.
- E. No partial payments, after the first payment, will be made until all partial release of liens are submitted for the preceding month's billing, as described
- F. Each Application for Payment shall be consistent with previous applications and payments as certified by and paid for by City.
- G. Payment Application Forms: Use City Form "PERIODIC ESTIMATE FOR PARTIAL PAYMENT" as form for Applications for Payment.
  1. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. City will return incomplete applications without action.
  2. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- H. Release of Lien: With each Application for Payment, submit release of lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial release of lien on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit final release of lien.
  3. City reserves the right to designate which entities involved in the Work must submit release of lien forms.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. Contractor's Construction Schedule (preliminary if not final).
  4. Products list.
  5. Schedule of unit prices.
  6. Submittals Schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits.
  10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  11. Initial progress report.
  12. Report of preconstruction conference.
  13. Certificates of insurance and insurance policies.
  14. Performance and payment bonds.
  15. Data needed to acquire City's insurance.
  16. Initial settlement survey and damage report if required.
- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. Evidence that claims have been settled.
  5. Final meter readings for utilities and similar data as of date of Substantial Completion or when City took possession of and assumed responsibility for corresponding elements of the Work.
  6. Final, liquidated damages settlement statement.
  7. Warranty, as-built, and other required closeout documents.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 012900**



**SECTION 013100  
PROJECT MANAGEMENT AND COORDINATION**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
1. Special Project Procedures
  2. Administrative and supervisory personnel.
  3. Project meetings.
  4. Requests for Interpretation (RFIs).
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
- C. Related Sections include the following:
1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
  2. Division 01 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.
  4. Division 01 Section "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

**1.3 DEFINITIONS**

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

**1.4 COORDINATION**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.

4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  1. Prepare similar memoranda for City and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  1. Preparation of Contractor's Construction Schedule.
  2. Preparation of the Schedule of Values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Preinstallation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.
  9. Project closeout activities.

## **1.5 SUBMITTALS**

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
  1. Name, address, and telephone number of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
- B. Key Personnel Names: Within 14 days of notice to proceed, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
  1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

## **1.6 SPECIAL PROJECT PROCEDURES**

- A. Discrepancies, Errors: Should discrepancies or errors appear in the drawings or specifications concerning materials, workmanship, or quantity of work to be performed, the Contractor will be required to immediately notify the City before proceeding with the work. If

the Contractor fails to notify the City and proceeds with the work, Contractor will be required to correct the errors at his/her own expense. In the event of a conflict between the drawings and specifications, the City will decide on the way to perform the work or supply the materials. See also General Conditions, "Contractor to Check Plans and Data," Section 5-76.

- B. Dimensions and Measurements: The figured dimensions on the drawings or notes including dimensions shall be used for construction instead of measurements of the drawings by scale. No scale measurements shall be used as a dimension for construction. Dimensions on all drawings as well as the detail drawings themselves are subject in every case to measurements of adjacent or previously completed work. All such measurements necessary shall be taken before undertaking any work dependent upon such data. Field verification of dimensions on plans is mandatory since actual locations, distances, and levels will be governed by actual field conditions.
- C. Discrepancies or Inconsistencies: Should any discrepancy or inconsistency appear between larger and smaller scale drawings in any of the divisions of the specifications or in any of the contract documents, such discrepancy shall be immediately submitted to the City for correction before proceeding with the work in question. In no case shall the Contractor make any alterations, erasures, changes or modifications in the drawings or specifications.
  - 1. Should it appear that any of the work as specified or shown by the drawings is not sufficiently detailed or explained, the Contractor shall apply to the City for such further details or information as may be necessary for full understanding of the work in question.
  - 2. The data set forth in these specifications and indicated on the drawings are as accurate as can be obtained, but their extreme accuracy is not guaranteed. Final application thereto shall be determined on the job as conditions may demand and subject to the approval of the City.
- D. Plans and Specifications Acknowledgment by Subcontractors and Suppliers: All Subcontractors and suppliers must submit, through the General Contractor to the City Engineer, a statement on their individual letterhead stationary, signed and sealed with their corporate seal, or a notarized statement on their letterhead stationery in the absence of a corporate seal, that the individual Subcontractor or Supplier:
  - 1. Has received or reviewed a FULL set of approved plans and specifications for the project,
  - 2. Is aware that items concerning their particular trade may be shown and/or detailed in other trades or sections of the plans and specifications, and
  - 3. Will comply with said plans, specifications and all applicable codes and permit requirements.
- E. In the event a Subcontractor or Supplier notes a mistake or details appear incomplete, or if there are questions or concerns with the plans and specifications, the Subcontractor or Supplier will immediately notify the General Contractor. No work will proceed until such conflicts or questions are resolved in writing.
- F. The Subcontractor will not be permitted to start work, nor will any Shop drawings/submittals be accepted for review from a supplier until this letter of acknowledgment is received and approved by the General Contractor and City Engineer. Also, the City will not process any pay request for the work of any Subcontractor or Supplier whose acknowledgment letter is

not on file with the City.

## **1.7 ADMINISTRATIVE AND SUPERVISORY PERSONNEL**

- A. The Contractor shall employ a competent superintendent who can communicate with spoken English, and who shall be in attendance at the site full-time when any work is in progress. The superintendent shall be satisfactory to the City's Engineer and shall not be changed except with the consent of the City's Engineer.
- B. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

## **1.8 PROJECT MEETINGS**

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
  - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify City Representative and Project Manager of scheduled meeting dates and times.
  - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including City Representative and Project Manager, within 48 hours of the completion of the meeting.
    - a. Minutes from all meetings shall be prepared by the Contractor, reflecting all items discussed as well as agreed upon or suggested solutions. These minutes shall be a true reflection of what actually happened at the meeting.
    - b. Items discussed and not resolved or being handled by any one of the parties present shall be reflected along with the name of the person responsible in all ongoing minutes until it is resolved.
    - c. Minutes shall be typewritten within 24 hours from the completion of the meeting. They shall immediately be FAXED to all parties present and followed by a copy through the mail.
    - d. All items requiring information and not resolved shall be reflected in each and every set of minutes thereafter until it is totally resolved
- B. Initialization Meeting: Approximately one (1) week prior to the Preconstruction meeting, the Contractor, the Project Manager and the City's Representative shall meet. The purpose of this meeting will be to quantify and clarify all items that must be presented by the Contractor at the Preconstruction meeting. The Contractor shall submit a schedule of values for the Project at this meeting for review by the City. The City's comments will be presented to the Contractor at the pre-construction meeting.
- C. Preconstruction Meeting: After the contract(s) has been awarded, executed, and a tentative work schedule has been composed, and prior to the start of the work, the Contractor(s), the Project Manager, the City's Representative, and other persons and/or governmental agencies that are involved shall meet. The minimum agenda is to include but is not limited to the following:
  - 1. Distribute and discuss list of major Subcontractors
  - 2. Tentative construction schedule

3. Phasing
4. Critical work sequencing and long-lead items
5. Designation of key personnel and their duties
6. Procedures for processing field decisions and Change Orders
7. Procedures for RFIs
8. Procedures for testing and inspecting
9. Adequacy of distribution of contract documents
10. Submittal of Shop drawings, project data, and samples
11. Procedures for maintaining Record documents
12. Use of premises
13. Protection of existing construction including landscape materials
14. Work restrictions
15. Responsibility for temporary facilities and controls
16. Procedures for disruptions and shutdowns.
17. Major equipment deliveries and priorities
18. Construction waste management and recycling
19. Parking availability
20. Office, work and storage areas.
21. Working hours
22. Safety and first-aid procedures
23. Security procedures
24. Housekeeping procedures including progress cleaning.
25. Schedule of values.
26. Processing of payments or contract.

D. Progress Meetings: Conduct progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of City and Project Manager, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
  - a. Review and approve minutes of previous Progress Meeting.
  - b. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - 1) Review schedule for next period.
  - c. Review present and future needs of each entity present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Status of submittals.

- 4) Deliveries.
  - 5) Off-site fabrication.
  - 6) Access.
  - 7) Site utilization.
  - 8) Temporary facilities and controls.
  - 9) Work hours.
  - 10) Hazards and risks.
  - 11) Progress cleaning.
  - 12) Quality and work standards.
  - 13) Status of correction of deficient items.
  - 14) Field observations.
  - 15) RFIs.
  - 16) Status of proposal requests.
  - 17) Pending changes.
  - 18) Status of Change Orders.
  - 19) Pending claims and disputes.
  - 20) Documentation of information for payment requests.
3. Minutes: General Contractor shall record the meeting minutes. These minutes shall indicate all items discussed as well as agreed upon or suggested solutions. They shall be a true reflection of what occurred at the meeting.
  4. Reporting: Within 24 hours, distribute minutes of the meeting by fax transmittal to each party present and to parties who should have been present.
    - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Project Closeout Conference: City shall Schedule and conduct a project closeout conference, at a time convenient to City and Project Manager, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of City, City's Commissioning Authority, Project Manager, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for preparing operations and maintenance data.
    - e. Requirements for delivery of material samples, attic stock, and spare parts.
    - f. Requirements for demonstration and training.
    - g. Preparation of Contractor's punch list.
    - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.

- i. Submittal procedures.
  - j. Coordination of separate contracts.
  - k. Owner's partial occupancy requirements.
  - l. Installation of Owner's furniture, fixtures, and equipment.
  - m. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

## 1.9 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
  1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
  1. City Project Number
  2. City Project Name.
  3. Date.
  4. Name of Contractor.
  5. RFI number, numbered sequentially.
  6. Specification Section number and title and related paragraphs, as appropriate.
  7. Drawing number and detail references, as appropriate.
  8. Field dimensions and conditions, as appropriate.
  9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  10. Contractor's signature.
  11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
    - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above. Word Template is available upon request from the City Engineer's Office.
  1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Project Manager's Action: Project Manager will review each RFI, determine action required, and return it. Allow seven working days for Project Manager's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
  1. The following RFIs will be returned without action:

- a. Requests for approval of submittals.
  - b. Requests for approval of substitutions.
  - c. Requests for coordination information already indicated in the Contract Documents.
  - d. Requests for adjustments in the Contract Time or the Contract Sum.
  - e. Requests for interpretation of Project Manager's actions on submittals.
  - f. Incomplete RFIs or RFIs with numerous errors.
2. Project Manager's action may include a request for additional information, in which case Project Manager's time for response will start again.
3. Project Manager's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
  - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Project Manager in writing within 10 days of receipt of the RFI response.
- E. On receipt of Project Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Project Manager within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Include the following:
  1. Project name.
  2. Name and address of Contractor.
  3. RFI number including RFIs that were dropped and not submitted.
  4. RFI description.
  5. Date the RFI was submitted.
  6. Date Project Manager's response was received.
  7. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

**PART 2 - PRODUCTS (Not Used)****PART 3 - EXECUTION (Not Used)****END OF SECTION 013100**



**SECTION 013200  
CONSTRUCTION PROGRESS DOCUMENTATION**

**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. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

- B. Related Sections include the following:

1. General Requirement Section "Payment Procedures" for submitting the Schedule of Values.
2. General Requirement Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. General Requirement Section "Submittal Procedures" for submitting schedules and reports.
4. General Requirement Section "Photographic Documentation" for submitting construction photographs.
5. General Requirement Section "Quality Requirements" for submitting a schedule of tests and inspections.

**1.3 DEFINITIONS**

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

- B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless

otherwise approved by Project Manager.

- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either City or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Milestone: A key or critical point in time for reference or measurement.
- H. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- C. CPM Reports: Concurrent with CPM schedule, submit three copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
  - 3. Total Float Report: List of all activities sorted in ascending order of total float.

- 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- D. Daily Construction Reports: Submit two copies at weekly intervals.
- E. Material Location Reports: Submit two copies at weekly intervals.
- F. Field Condition Reports: Submit two copies at time of discovery of differing conditions.
- G. Special Reports: Submit two copies at time of unusual event.

## **1.5 QUALITY ASSURANCE**

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Project Manager's request.

## **1.6 COORDINATION**

- A. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
  - 1. Secure time commitments for performing critical elements of the Work from parties involved.
  - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

## **PART 2 - PRODUCTS**

### **2.1 SUBMITTALS SCHEDULE**

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
  - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

### **2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL**

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
  - 2. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Project Manager.
  - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in

Contractor's construction schedule with submittal schedule.

4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Project Manager's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

B. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. City-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
2. Work Restrictions: Show the effect of the following items on the schedule:
  - a. Coordination with existing construction.
  - b. Uninterruptible services.
  - c. Use of premises restrictions.
  - d. Seasonal variations.
  - e. Environmental control.
3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
  - a. Subcontract awards.
  - b. Submittals.
  - c. Purchases.
  - d. Fabrication.
  - e. Sample testing.
  - f. Deliveries.
  - g. Installation.
  - h. Tests and inspections.
  - i. Adjusting.
  - j. Curing.
  - k. Building flush-out.
  - l. Startup and placement into final use and operation.
4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
  - a. Structural completion.
  - b. Temporary enclosure and space conditioning.
  - c. Permanent space enclosure.
  - d. Completion of mechanical installation.
  - e. Completion of electrical installation.
  - f. Substantial Completion.

- C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, Final Completion, and Certificate of Occupancy.
- D. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
  - 1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  - 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- G. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.
  - 1. Microsoft Project 2000 for Windows 2000 operating system.

## **2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)**

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

## **2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)**

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
    - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Project Manager's approval of the schedule.
  2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  3. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
    - h. Work by City that may affect or be affected by Contractor's activities.
    - i. Testing and commissioning.
    - j. Punch list and final completion.
    - k. Activities occurring following final completion.
  2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
  3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
    - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
  5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Project Manager's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the

Contract Sum.

- a. Each activity cost shall reflect an appropriate value subject to approval by Project Manager.
  - b. Total cost assigned to activities shall equal the total Contract Sum.
- D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Principal events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
  9. Average size of workforce.
  10. Dollar value of activity (coordinated with the Schedule of Values).
- F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.
- G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
  2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
  3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
  4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
    - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

## 2.5 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
  2. Approximate count of personnel at Project site.
  3. Equipment at Project site.
  4. Material deliveries.
  5. High and low temperatures and general weather conditions.
  6. Accidents.
  7. Meetings and significant decisions.
  8. Unusual events (refer to special reports).
  9. Stoppages, delays, shortages, and losses.
  10. Meter readings and similar recordings.
  11. Emergency procedures.
  12. Orders and requests of authorities having jurisdiction.
  13. Change Orders received and implemented.
  14. Construction Change Directives received and implemented.
  15. Services connected and disconnected.
  16. Equipment or system tests and startups.
  17. Partial Completions and occupancies.
  18. Substantial Completions authorized.
- B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
  2. Material stored prior to previous report and since removed from storage and installed.
  3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## 2.6 SPECIAL REPORTS

- A. General: Submit special reports directly to City within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise City in advance when these events are known or predictable.



**PART 3 - EXECUTION****3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Project Manager, City Representative, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

**END OF SECTION 013200**

**SECTION 013233  
PHOTOGRAPHIC DOCUMENTATION**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Periodic construction photographs.
  - 3. Final Completion construction photographs.
- B. Related Sections include the following:
  - 1. General Requirement Section "Submittal Procedures" for submitting photographic documentation.
  - 2. General Requirement Section "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.
  - 3. General Requirement Section "Site Clearing" for photographic documentation before site clearing operations commence.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Construction Photographs: Submit digital media files of each photographic view within seven days of taking photographs.
  - 1. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph. File names shall be in the following format: City project number – date taken (YYMMDD) – picture number (example: 12356-241211-011 would indicate project number 12356 taken on December 11, 2024 photograph number 11). Submit via email or FTP link.

**1.4 COORDINATION**

- A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

**1.5 USAGE RIGHTS**

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

**PART 2 - PRODUCTS****2.1 PHOTOGRAPHIC MEDIA**

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

**PART 3 - EXECUTION****3.1 CONSTRUCTION PHOTOGRAPHS**

- A. Aerial Photographer: Engage a qualified commercial aerial photographer to take aerial construction photographs. Drone photo can be submitted, however, the preapproval from FAA is required for the drone flight above the airport.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Monthly Aerial Photographs: Take monthly aerial photographs to document progress. Take photographs from various viewpoints to document all areas of work. Such photographs shall document actual installed conditions.
- D. Daily Progress Photographs: Take daily photographs to document progress. Take photographs of all work that will be concealed by subsequent construction activity (such as rough electrical, rough plumbing and rough ductwork). Such photographs shall fully document actual installed conditions.
- E. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Date and Time: Include date and time in filename for each image.
  - 2. Field Office Images: Maintain one set of images accessible at the field office at Project site, available at all times for reference. Identify images same as for those submitted to Project Manager.
- F. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.
  - 1. Flag construction limits before taking construction photographs.
  - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
  - 3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
  - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- G. Periodic Construction Photographs: Take minimum 20 photographs weekly, with timing each

month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points, including aerial photographs to show status of construction and progress since last photographs were taken.

- H. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as Project Record Documents. Project Manager will direct photographer for desired vantage points.
  - 1. Do not include date stamp.

**END OF SECTION 013233**

**SECTION 013300  
SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
  - 1. General Requirement Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
  - 2. General Requirement Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
  - 3. General Requirement Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
  - 4. General Requirement Section "Photographic Documentation" for submitting construction photographs and construction video recordings.
  - 5. General Requirement Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
  - 6. General Requirement Section "Closeout Procedures" for submitting warranties.
  - 7. General Requirement Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 8. General Requirement Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.

**1.3 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Project Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Project Manager's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

#### 1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Project Manager and additional time for handling and reviewing submittals required by those corrections.
  - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
  - 4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Project Manager's final release or approval.
    - g. Scheduled date of fabrication.
    - h. Scheduled dates for purchasing.
    - i. Scheduled dates for installation.
    - j. Activity or event number.

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Project Manager's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Project Manager for Contractor's use in preparing submittals.
  - 1. Project Manager will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
    - a. Project Manager makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    - b. Digital Drawing Software Program: The Contract Drawings are available in AutoCad 2009 dwg format.
    - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to City of Fort Lauderdale and Project Manager.

- d. City of Fort Lauderdale will supply data licensing agreement form to Contractor.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Project Manager reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Project Manager's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Project Manager will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 10 days for review of each resubmittal.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
  1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately **3 by 6 inches (75 by 150 mm)]** on label or beside title block to record Contractor's review and approval markings and action taken by Project Manager.
  3. Include the following information for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name of Project Manager.
    - d. Name of Contractor.
    - e. Name of subcontractor.
    - f. Name of supplier.
    - g. Name of manufacturer.
    - h. Submittal number or other unique identifier, including revision identifier.
  - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01).

Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

- i. Number and title of appropriate Specification Section.
  - j. Drawing number and detail references, as appropriate.
  - k. Location(s) where product is to be installed, as appropriate.
  - l. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Project Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
  5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Project Manager will return without review submittals received from sources other than Contractor.
    - a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
      - 1) Project name.
      - 2) Date.
      - 3) Destination (To:).
      - 4) Source (From:).
      - 5) Name of Project Manager.
      - 6) Name of Contractor.
      - 7) Name of firm or entity that prepared submittal.
      - 8) Names of subcontractor, manufacturer, and supplier.
      - 9) Category and type of submittal.
      - 10) Submittal purpose and description.
      - 11) Specification Section number and title.
      - 12) Specification paragraph number or drawing designation and generic name for each of multiple items.
      - 13) Drawing number and detail references, as appropriate.
      - 14) Indication of full or partial submittal.
      - 15) Transmittal number.
      - 16) Submittal and transmittal distribution record.
      - 17) Remarks.
      - 18) Signature of transmitter.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., 10905-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 10905-061000.01.A).



3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Project Manager.
  4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name of Project Manager.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Category and type of submittal.
    - h. Submittal purpose and description.
    - i. Specification Section number and title.
    - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    - k. Drawing number and detail references, as appropriate.
    - l. Location(s) where product is to be installed, as appropriate.
    - m. Related physical samples submitted directly.
    - n. Indication of full or partial submittal.
    - o. Transmittal number.
    - p. Submittal and transmittal distribution record.
    - q. Other necessary identification.
    - r. Remarks.
  5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
    - a. Project name.
    - b. Number and title of appropriate Specification Section.
    - c. Manufacturer name.
    - d. Product name.
- F. Options: Identify options requiring selection by Project Manager.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Project Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
  2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked with approval notation from Project Manager's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for

performance of construction activities. Show distribution on transmittal forms.

- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Project Manager's action stamp.

## **PART 2 - PRODUCTS**

### **2.1 SUBMITTAL PROCEDURES**

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Submit electronic submittals via email as PDF electronic files.
    - a. Project Manager will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Action Submittals: Submit ten paper copies of each submittal unless otherwise indicated. Project Manager will return nine copies.
  - 3. Informational Submittals: Submit ten paper copies of each submittal unless otherwise indicated. Project Manager will return nine copies.
  - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.

- c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  - 5. Submit Product Data before or concurrent with Samples.
  - 6. Submit Product Data in the following format:
    - a. PDF electronic file.
    - b. ten paper copies of Product Data unless otherwise indicated. Project Manager will return nine copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Project Manager's digital data drawing files is otherwise permitted.
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 24 by 36 inches (610 by 915 mm).
  - 3. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
    - b. ten opaque copies of each submittal. Project Manager will retain one copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
  - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  - 2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics,

and identification information for record.

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 that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Project Manager will return one submittal with options selected.
  6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    - a. Number of Samples: Submit seven sets of Samples. Project Manager will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
      - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:
    - a. PDF electronic file.

- b. Five paper copies of product schedule or list unless otherwise indicated. Project Manager will return two copies.
- F. Coordination Drawing Submittals: Comply with requirements specified in General Requirement Section "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in General Requirement Section "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in General Requirement Section "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in General Requirement Section "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in General Requirement Section "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in General Requirement Section "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Project Managers and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency,

or on comprehensive tests performed by a qualified testing agency.

- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Project Manager.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit ten paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

**PART 3 - EXECUTION****3.1 CONTRACTOR'S REVIEW**

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Project Manager.
- B. Project Closeout and Maintenance Material Submittals: See requirements in General Requirement "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

**3.2 PROJECT MANAGER'S ACTION**

- A. General: Project Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Project Manager will review each submittal, make marks to indicate corrections or modifications required, and return it. Project Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
  - 1. Approved as submitted
  - 2. Approved as noted
  - 3. Revise and resubmit
  - 4. Rejected.
- C. Informational Submittals: Project Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Project Manager will forward each submittal to appropriate party.
- D. Partial or incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

**END OF SECTION 013300**

## SECTION 014000 QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Project Manager, City, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

#### 1.3 DEFINITIONS

- A. 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.
- B. 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. Services do not include contract enforcement activities performed by Project Manager.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, 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. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
  2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
  3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. 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, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

#### 1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Project Manager for a decision before proceeding.
- 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 Project Manager for a decision before proceeding.

## 1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior, laboratory mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
  - 1. Indicate manufacturer and model number of individual components.
  - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data : For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
  - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Project Manager.
  - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Project Manager.
- D. 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.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.

## 1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Project Manager. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
  - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Project Manager has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

## 1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, 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.

## 1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Project Manager and Commissioning Authority, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Project Manager and or Construction Manager.
  2. Notify Project Manager and Construction Manager seven days in advance of dates and times when mockups will be constructed.
  3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
  4. Demonstrate the proposed range of aesthetic effects and workmanship.
  5. Obtain Project Manager's and Construction Manager's approval of mockups before starting work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings and as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- M. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Project Manager to evaluate quality of the Work. Provide room mockups of the following rooms:
1. Bunk room
  2. Kitchen

## 1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.

3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Project Manager, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Project Manager, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Project Manager, Commissioning Authority, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

## 1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: The City will engage a qualified testing agency and special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections referred to in this Section, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency and special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections referred to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.



2. Notifying Project Manager, Commissioning Authority, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Project Manager and Commissioning Authority with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

## **PART 2 - PRODUCTS (Not Used)**

## **PART 3 - EXECUTION**

### **3.1 ACCEPTABLE TESTING AGENCIES**

- A. All City of Fort Lauderdale approved AGENCIES.

### **3.2 TEST AND INSPECTION LOG**

- A. Prepare a record of tests and inspections. Include the following:
  1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Project Manager.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Project Manager's and Commissioning Authority's, reference during normal working hours.

### **3.3 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

**SECTION 017419**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition and construction waste.
  - 2. Recycling nonhazardous construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.

**1.3 DEFINITIONS**

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

**1.4 PERFORMANCE REQUIREMENTS**

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
  - 1. Construction Waste:
    - a. Masonry and CMU.
    - b. Lumber.
    - c. Wood sheet materials.
    - d. Wood trim.

- e. Metals.
- f. Roofing.
- g. Insulation.
- h. Carpet and pad.
- i. Gypsum board.
- j. Piping.
- k. Electrical conduit.
- l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
  - 1) Paper.
  - 2) Cardboard.
  - 3) Boxes.
  - 4) Plastic sheet and film.
  - 5) Polystyrene packaging.
  - 6) Wood crates.
  - 7) Plastic pails.

## 1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit 3 copies of plan within 7 days of date established for the Notice to Proceed.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste. Include the following information:
  - 1. Material category.
  - 2. Generation point of waste.
  - 3. Total quantity of waste in **tons (tonnes)**.
  - 4. Quantity of waste salvaged, both estimated and actual in **tons (tonnes)**.
  - 5. Quantity of waste recycled, both estimated and actual in **tons (tonnes)**.
  - 6. Total quantity of waste recovered (salvaged plus recycled) in **tons (tonnes)**.
  - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by

landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- G. Qualification Data: For waste management coordinator and refrigerant recovery technician.
- H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

## 1.7 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
  - 2. Review requirements for documenting quantities of each type of waste and its disposition.
  - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - 5. Review waste management requirements for each trade.

## 1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste and. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this

- Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste. Include the following:
1. Total quantity of waste.
  2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
  3. Total cost of disposal (with no waste management).
  4. Revenue from salvaged materials.
  5. Revenue from recycled materials.
  6. Savings in hauling and tipping fees by donating materials.
  7. Savings in hauling and tipping fees that are avoided.
  8. Handling and transportation costs. Include cost of collection containers for each type of waste.
  9. Net additional cost or net savings from waste management plan.

## **PART 2 - PRODUCTS (Not Used)**

## **PART 3 - EXECUTION**

### **3.1 PLAN IMPLEMENTATION**

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with operation, termination, and removal requirements in Division 01 Section "Temporary Facilities and Controls."
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site for duration of Project and at site meeting to be coordinated between City/owner rep and contractor.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
  2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.
- E. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches (300 mm) or more.

### 3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:
1. TBD by contractor.
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to City.
- D. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- E. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
  4. Store components off the ground and protect from the weather.
  5. Remove recyclable waste from City's property and transport to recycling receiver or processor.

**3.3 RECYCLING CONSTRUCTION WASTE****A. Packaging:**

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

**B. Wood Materials:**

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
  - a. Comply with requirements in Division 32 Section "Plants." for use of clean sawdust as organic mulch.

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

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
  - a. Comply with requirements in Division 32 Section "Plants." for use of clean ground gypsum board as inorganic soil amendment.

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

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

**B. Burning:** Do not burn waste materials.**C. Burning:** Burning of waste materials is permitted only at designated areas on City's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.**D. Disposal:** Remove waste materials and dispose of at designated spoil areas on City's property.**E. Disposal:** Remove waste materials from City's property and legally dispose of them.**END OF SECTION 017419**



**SECTION 017700  
CLOSEOUT PROCEDURES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Sections include the following:
  - 1. Supplemental Condition Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
  - 2. Supplemental Condition Section "Photographic Documentation" for submitting Final Completion construction photographs and negatives.
  - 3. Supplemental Condition Section "Execution Requirements" for progress cleaning of Project site.
  - 4. Supplemental Condition Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 5. Supplemental Condition Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 6. Supplemental Condition Section "Demonstration and Training" for requirements for instructing City's personnel.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

**1.4 CLOSEOUT SUBMITTALS**

Certificates of Release:

From authorities having jurisdiction.

- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

## 1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Supplemental Condition Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Divisions 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Project Manager. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Project Manager's signature for receipt of submittals.
  - 5. Submit test/adjust/balance records.
  - 6. Submit sustainable design submittals required in Supplemental Condition sustainable design requirements Section and in individual Division 02 through 33 Sections.
  - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Supplemental Condition Section "Demonstration and Training."

6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Project Manager will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Project Manager, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

## **1.7 FINAL COMPLETION PROCEDURES**

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Supplemental Condition Section "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Project Manager's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Project Manager. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Project Manager will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

## **1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)**

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and

- proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
  - a. Project number and name.
  - b. Date.
  - c. Name of Project Manager
  - d. Name of Contractor.
  - e. Page number.
4. Submit list of incomplete items in the following format:
  - a. MS Excel electronic file. Project Manager will return annotated file.
  - b. PDF electronic file. Project Manager will return annotated file.
  - c. Three paper copies. Project Manager will return two copies.

## 1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Project Manager for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
  1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially

hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## **PART 3 - EXECUTION**

### **3.1 FINAL CLEANING**

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - g. Sweep concrete floors broom clean in unoccupied spaces.
    - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - j. Remove labels that are not permanent.
    - k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - l. Replace parts subject to unusual operating conditions.
    - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - n. Replace disposable air filters and clean permanent air filters. Clean exposed

- surfaces of diffusers, registers, and grills.
- o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
  - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
- p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Supplemental Condition Section "Temporary Facilities and Controls." Prepare a report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Supplemental Condition Section "Temporary Facilities and Controls." Supplemental Condition Section "Construction Waste Management and Disposal."

### **3.2 REPAIR OF THE WORK**

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
  - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

**END OF SECTION 017700**

**SECTION 017823  
OPERATION AND MAINTENANCE DATA**

**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. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
1. Operation and maintenance documentation directory.
  2. Emergency manuals.
  3. Operation manuals for systems, subsystems, and equipment.
  4. Product maintenance manuals.
  5. Systems and equipment maintenance manuals.

**1.3 DEFINITIONS**

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

**1.4 CLOSEOUT SUBMITTALS**

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
1. Project Manager and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
  2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Project Manager.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.
  2. Three Insert number paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Project Manager

will return two copies.

- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Project Manager and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Project Manager and Commissioning Authority will return copy with comments.
  - 1. Correct or revise each manual to comply with Project Manager's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Project Manager's and Commissioning Authority's comments and prior to commencing demonstration and training.
- E.

## **PART 2 - PRODUCTS**

### **2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY**

- A. Organization: Include a section in the directory for each of the following:
  - 1. List of documents.
  - 2. List of systems.
  - 3. List of equipment.
  - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### **2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS**

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- B. Title Page: Include the following information:



1. Subject matter included in manual.
  2. Name and address of Project.
  3. Date of submittal.
  4. Name and contact information for Contractor.
  5. Name and contact information for Construction Manager.
  6. Name and contact information for Project Manager.
  7. Name and contact information for Commissioning Authority.
  8. Names and contact information for major consultants to the Project Manager that designed the systems contained in the manuals.
  9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of City's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
  1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

## 2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in

individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and

telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
  2. Troubleshooting guide.
  3. Precautions against improper maintenance.
  4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

## **PART 3 - EXECUTION**

### **3.1 MANUAL PREPARATION**

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by City's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by City's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each

product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
  2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
- G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

**END OF SECTION 017823**

**SECTION 017839  
PROJECT RECORD DOCUMENTS**

**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. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
1. Record Drawings.
  2. Record Specifications.
  3. Record Product Data.
  4. Miscellaneous record submittals
- B. Related Sections include the following:
1. Supplemental Condition Section "Closeout Procedures" for general closeout procedures.
  2. Supplemental Condition Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  3. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

**1.3 CLOSEOUT SUBMITTALS**

- A. Record Drawings: Comply with the following:
1. Number of Copies: Submit one set(s) of marked-up record prints.
  2. Number of Copies: Submit copies of record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit two paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned record prints and one of file prints.
      - 3) Submit record digital data files and one set(s) of plots.
      - 4) Project Manager will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:
      - 1) Submit three paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned record prints and three set(s) of prints.
      - 3) Print each drawing, whether or not changes and additional information were recorded.

- c. Final Submittal:
  - 1) Submit one paper-copy set(s) of marked-up record prints.
  - 2) Submit record digital data files and three set(s) of record digital data file plots.
  - 3) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.



- f. Revisions to electrical circuitry.
  - g. Actual equipment locations.
  - h. Duct size and routing.
  - i. Locations of concealed internal utilities.
  - j. Changes made by Change Order or Construction Work Change Directive.
  - k. Changes made following Project Manager's written orders.
  - l. Details not on the original Contract Drawings.
  - m. Field records for variable and concealed conditions.
  - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Project Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
  2. Format: DWG, Version , Microsoft Windows operating system.
  3. Format: Annotated PDF electronic file with comment function enabled.
  4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  5. Refer instances of uncertainty to Project Manager for resolution.
  6. Project Manager will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
- a. See Division 01 Section "Submittal Procedures" for requirements related to use of Project Manager's digital data files.
  - b. Project Manager will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Project Manager determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Consult Project Manager for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
  - a. Project name.
  - b. Date.
  - c. Designation "PROJECT RECORD DRAWINGS."
  - d. Name of Project Manager.
  - e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
  1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
  5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file scanned PDF electronic file(s) of marked-up paper copy of Specifications.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file paper copy scanned PDF electronic file(s) of marked-up paper copy of Product Data.
  1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

**2.4 MISCELLANEOUS RECORD SUBMITTALS**

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file paper copy scanned PDF electronic file(s) of marked-up miscellaneous record submittals.
  - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

**PART 3 - EXECUTION****3.1 RECORDING AND MAINTENANCE**

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Project Manager's reference during normal working hours.
- C. Record Documents of water, sewer and drainage must be provided for the General Contractor by a Professional Land Surveyor and must be satisfactory for approval by the Broward County Health Department and the Broward County Department of Planning and Environmental Protection.
- D. Final pay request will not be processed until Record Documents have been completed and submitted to the City.

**END OF SECTION 017839**

**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. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
  - 1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after 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 following the end of Part 3.

**1.4 REQUESTS FOR INFORMATION**

- A. If latent or unforeseen conditions arise that may require changes in the Work, the Contractor may submit a Request for Information to the Project Manager on the form included following the end of Part 3.

**1.5 PROPOSAL REQUESTS**

- A. City-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. 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 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.

- 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.
  6. Comply with requirements in General Conditions Section GC-03 "Substitution" if the proposed change requires substitution of one product or system for product or system specified.

## **1.6 ADMINISTRATIVE CHANGE ORDERS**

- A. Unit Price Adjustment: Refer to Construction Agreement, Article 14, for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit price work.

## **1.7 CHANGE ORDER PROCEDURES**

- A. On City's approval of a Proposal Request, Engineer will issue a Change Order for signature of the Contractor on City's standard form. The Change Order will not be official until approved by the appropriate City Officials and signed by the City Engineer, City Manager.

## **PART 2 - PRODUCTS (Not Used)**

## **PART 3 - EXECUTION (Not Used)**

**END OF SECTION 012600**

**SUPPLEMENTAL INSTRUCTIONS  
FOR MINOR CHANGES**

CITY OF FORT LAUDERDALE

CITY PROJECT NO: #P

REQUEST NO:

PROJECT:

OWNER: **City of Fort Lauderdale**

DATE:

CONTRACTOR:

TO:

CONTRACT DATED:

The work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Prior to proceeding in accordance with these instructions, indicate your acceptance of these instructions for minor changes to the Work as consistent with the Contract Documents and return a copy to the City.

DESCRIPTION:

ATTACHMENTS:

ENGINEER:

FAXED TO: ( ) Contractor  
( ) Site Office  
( ) Eng. Insp. (954) 828-5074

CC: Project Inspector  
Main File

**PROPOSAL REQUEST**  
**CITY OF FORT LAUDERDALE**

CITY PROJECT NO: **#P** \_\_\_\_\_ REQUEST NO: \_\_\_\_\_

PROJECT: \_\_\_\_\_ DATE: \_\_\_\_\_  
OWNER: **City of Fort Lauderdale** CONTRACTOR: \_\_\_\_\_  
TO: \_\_\_\_\_ CONTRACT DATED: \_\_\_\_\_

Please submit an itemized quotation for changes in the **CONTRACT SUM** and/or **TIME** incidental to the proposed modifications to the Contract Documents described herein.

**THIS IS NOT A CHANGE ORDER NOR A DIRECTION TO PROCEED WITH THE  
WORK DESCRIBED HEREIN.**

DESCRIPTION:

ATTACHMENTS:

ENGINEER: \_\_\_\_\_

FAXED TO: (    ) Contractor  
(    ) Site Office  
(    ) Eng. Insp. (954) 828-5074

CC: Project Inspector  
Main File

**REQUEST FOR SUBSTITUTION**  
**CITY OF FORT LAUDERDALE**

CITY PROJECT NO: #P

REQUEST NO:

PROJECT:  
OWNER: City of Fort Lauderdale  
TO:DATE:  
CONTRACTOR:  
CONTRACT DATED:

NAME AND ADDRESS OF CONTRACTOR:

hereby requests acceptance of the following product or system as an "acceptable substitution".

**NAME AND DESCRIPTION OF SPECIFIED PRODUCT OR SYSTEM:**

MANUFACTURER:

SPECIFICATION SECTION \_\_\_\_\_, PAGE(S) \_\_\_\_\_

PARAGRAPH(S) \_\_\_\_\_

DRAWING \_\_\_\_\_ DETAIL NUMBER \_\_\_\_\_

**NAME AND DESCRIPTION OF PROPOSED SUBSTITUTION:**

MANUFACTURER: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

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

NAME OF VENDOR: \_\_\_\_\_

NAME AND ADDRESS OF PREVIOUS PROJECT WHERE PROPOSED SUBSTITUTION  
WAS UTILIZED:

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

REASON FOR PROPOSING SUBSTITUTION: \_\_\_\_\_

DOES SUBSTITUTION AFFECT OTHER MATERIALS, INSTALLATION OR SYSTEMS?

YES \_\_\_\_\_ NO \_\_\_\_\_ IF YES, ATTACHED COMPLETE DATA.

DOES SUBSTITUTION REQUIRE REVISION OR REDESIGN OF ANY COMPONENT OF  
BUILDING OR ELECTRICAL OR MECHANICAL WORK?

YES \_\_\_\_\_ NO \_\_\_\_\_ IF YES, ATTACHED COMPLETE DATA.

**THE ATTACHED DATA IS FURNISHED FOR EVALUATION OF THE SUBSTITUTION:**

( ) CATALOG ( ) DRAWINGS ( ) SAMPLES ( ) TESTS ( ) REPORTS ( ) OTHER

**REQUEST FOR SUBSTITUTION**



**SAVING TO CITY FOR ACCEPTING SUBSTITUTE:**

COST OF SPECIFIED ITEM:

\_\_\_\_\_ DOLLARS  
(\$ \_\_\_\_\_)

COST OF SUBSTITUTION ITEM:

\_\_\_\_\_ DOLLARS  
(\$ \_\_\_\_\_)

TOTAL SAVINGS (CREDIT) TO CITY FOR ACCEPTING SUBSTITUTE:

\_\_\_\_\_ DOLLARS  
(\$ \_\_\_\_\_)

THE UNDERSIGNED HEREBY CERTIFIES THAT THIS PROPOSED SUBSTITUTION HAS BEEN FULLY CHECKED AND COORDINATED WITH THE CONTRACT DOCUMENTS, THAT THE PROPOSED SUBSTITUTION MEETS OR EXCEEDS THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND THAT ALL INFORMATION IS TRUE AND ACCURATE.

FIRM NAME: \_\_\_\_\_

BY: \_\_\_\_\_

DATE SIGNED: \_\_\_\_\_

PRINT NAME LEGIBLY: \_\_\_\_\_

FAXED TO:

CC

**SECTION 015000  
TEMPORARY FACILITIES AND CONTROLS**

**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. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities. Contractor to provide temporary trailer, secured per code, to contain permit drawings and as contractor's site office. This temporary facility to be air conditioned.
- B. Related Sections include the following:
  - 1. Supplemental Condition Section "Summary" for limitations on utility interruptions and other work restrictions.
  - 2. Supplemental Condition Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.

**1.3 DEFINITIONS**

- A. Permanent Enclosure: As determined by Project Manager, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

**1.4 USE CHARGES**

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, City's Representative, Project Manager, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

**1.5 SUBMITTALS**

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for

construction personnel.

## **1.6 QUALITY ASSURANCE**

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

## **1.7 PROJECT CONDITIONS**

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before City's acceptance, regardless of previously assigned responsibilities.

# **PART 2 - PRODUCTS**

## **2.1 MATERIALS**

- A. Pavement: Comply with Division 32 pavement Sections.
- B. Chain-Link Fencing: Minimum 0.148-inch, thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top rails.
- C. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."
- D. Paint: Comply with requirements in Division 09 painting Sections.

## **2.2 TEMPORARY FACILITIES**

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel, including City's Representative. Keep office clean and orderly. Furnish and equip offices as follows:
  - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
  - 2. Conference room of sufficient size to accommodate meetings of 10 to 12 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack board.
  - 3. Drinking water and private toilet.
  - 4. Coffee machine and supplies.
  - 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 76 deg F.
  - 6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
  - 7. Dedicated telephone line for facsimile machine.
  - 8. Facsimile machine and all supplies, including maintenance and electrical service.

9. Copy machine and all supplies, including maintenance and electrical service.
  10. Answering machine on Contractor's telephone line.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from building.
- D. The following additional facilities as required for completion of the work.
1. Construction signs.
  2. Contractor's and subcontractor's equipment.
  3. Temporary containers for construction waste materials.
  4. Temporary barricades, railings and fences.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless City authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  3. Permanent HVAC System: If City authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
1. Arrange with utility company, City, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
1. Connect temporary sewers to city system as directed by authorities having jurisdiction.

- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Use of City's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to City. At Substantial Completion, restore these facilities to condition existing before initial use.
  - 1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service, unless otherwise indicated.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install at least one telephone line for each field office.
  - 1. Provide additional telephone lines for the following:
    - a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
    - b. Provide one telephone line for City's use.
  - 2. At each telephone, post a list of important telephone numbers.
    - a. Police and fire departments.
    - b. Ambulance service.
    - c. Contractor's home office.
    - d. Project Manager.

- e. Engineers.
  - f. City of Fort Lauderdale Construction Manager.
  - g. Principal subcontractors' field and home offices.
3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- K. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.
1. Provide DSL in primary field office.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
- 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
  - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to City.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
- 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Provide temporary parking areas for construction personnel.
- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
- 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
- E. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated in contract documents. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
- 1. Provide temporary, directional signs for construction personnel and visitors.
  - 2. Maintain and touchup signs so they are legible at all times.
- F. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable

effects.

- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  - 1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for City. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide City with one set of keys.
- G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of Florida Building Code Chapter 33 for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by City from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied

side, and fire-retardant plywood on construction operations side.

2. Construct dustproof partitions with 2 layers of 3-mil polyethylene sheet on each side. Cover floor with 2 layers of 3-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.
  - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
3. Insulate partitions to provide noise protection to occupied areas.
4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
5. Protect air-handling equipment.
6. Weather strip openings.
7. Provide walk-off mats at each entrance through temporary partition.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### **3.5 OPERATION, TERMINATION, AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.



1. Materials and facilities that constitute temporary facilities are property of Contractor. City reserves right to take possession of Project identification signs.
2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

**END OF SECTION 015000**

# Construction Sign Request Form

P12356

Title (Bold):

**FXE AES FACILITY EXPANSION**

**PROJECT NO. 12356**

Title (Not Bold):

What's Happening?

Expansion AES Fort Lauderdale Executive Airport to comply with current airfield standards.

Benefits:

These improvements will reduce the operating and maintenance costs for the Airport.

Number of Neighbors Benefitted:

N/A

Cost:

T.B.D

Month and Year of Expected Completion:

T.B.D

Contractor:

T.B.D

Phone: 954-828-8000

We're Working On:

- Expanding the existing building
- Installing new doors
- Installing new LED lights

Project Manager Signature

Date

Senior Project Manager Signature

Date

015900-2

**[THIS PAGE INTENTIONALLY LEFT BLANK]**

**SECTION 015900 – CONSTRUCTION SIGN****PART 1 GENERAL**

Contractor, at contractor's expense, shall furnish and install a **4' x 8'** sign (with white painted posts) prior to start of construction. A sample sign template is below but is not specific to the project. The exact style and design of the sign will be provided by the CITY to the Contractor during the preconstruction meeting in PDF format.



# City of Fort Lauderdale

## Keeping the Ocean in the Ocean

### Bringing Drier Streets to Hendricks Isle

**What's Happening?**  
The City of Fort Lauderdale is combating poor roadway drainage resulting from seasonal high tides and major rain events.

[www.fortlauderdale.gov](http://www.fortlauderdale.gov)

**Benefits 5,000 Neighbors**

- Improved vehicular access during high tide and rain events
- Better drainage of roadway
- Enhanced neighborhood

**Phone**  
(954) 828-8000

**Cost**  
\$20,000

**Completion**  
August 2013

**Contractor**  
ABC Company

**We're Working On:**

- Installing interconnected underground catch basins
- Cleaning existing drainage pipes, including the outfall pipes
- Removing and replacing the concrete valley gutters that transport water to the catch basins
- Installing drainage valves to help alleviate flooding from high tides

### Fort Lauderdale City Commission

John P. "Jack" Seiler Mayor	Bruce G. Roberts Vice Mayor, District I	Dean J. Trantalis Commissioner, District II	Bobby B. DuBose Commissioner, District III	Romney Rogers Commissioner, District IV	Lee R. Feldman, ICMA-CM City Manager
--------------------------------	--	--	---	--	---

See Page 2, "Construction Sign Request Form", for information on the sign for this Project.

**END OF SECTION**

**[THIS PAGE INTENTIONALLY LEFT BLANK]**



## PUNCH LIST

Project: \_\_\_\_\_  
\_\_\_\_\_

From (A/E): \_\_\_\_\_

Site Visit Date: \_\_\_\_\_

To (Contractor): \_\_\_\_\_  
\_\_\_\_\_

A/E Project Number: \_\_\_\_\_

Contract For: \_\_\_\_\_

The following items require the attention of the Contractor for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Item Number	Room Number	Location (Area)	Description	Correction/Completion Date	Verification A/E Check
----------------	----------------	--------------------	-------------	-------------------------------	---------------------------

☐ Attachments

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

Copies: ☐ Owner ☐ Consultants ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ File



CITY OF FORT LAUDERDALE

## Fort Lauderdale Executive Airport

### Final Inspection Punch-List Corrective Action Form

Project Number: \_\_\_\_\_

Project Name: \_\_\_\_\_

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

Contractor: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Inspector: \_\_\_\_\_

Item No.	Description of Deficiency	Date Completed		Comments
		Contractor	PM/CI	

Instructions for completing the *Final Inspection Punch-list Corrective Action Form*.

---

The Construction Project Manager, in conjunction with the assigned construction inspector is responsible for preparing this form. It shall be completed in cooperation with the project's prime contractor and will be used as the official record for any and all punch-list items. Under no circumstances shall final payment be made until all items identified on this form are corrected to the satisfaction of the Construction Project Manager.

1. Prior to scheduling Substantial Completion/Final Inspection, all permits should be cleared by the building department, all O&M Manuals should be turned over to the city, and all warranty information should be provided in a three ring binder and on CD-ROM.
2. Schedule inspection, coordinating with necessary staff to properly evaluate the completeness of the project.
3. The Final Inspection Punch-list Corrective Action Form is to be used to document discrepancies that are minor in nature (i.e., paint chips, minor blemishes, etc....) if major items of work are not complete, lack required quality, or are not acceptable for any reason, the final inspection should be rescheduled for a time when these items have been completed.
4. Fill in the form completely: Project Number and Name, Date of inspection, the contractor's name, PM and inspector's names should all be filled in.
5. Beginning with item number 1, list the description of the deficiency, and any amplifying information required to fully document the item to be corrected. For instance, Item No. 1; Description of Deficiency - Door entering main office sticks; Notes – Door should be adjusted to open and close properly.
6. Use as many forms as required to fully document the inspection results. In the lower right hand side of the form indicate page number and total number of forms used (for example 1 of 4)
7. If there is any disagreement as to whether or not an item is a deficiency, it should be documented and then
8. When an item is corrected, the Contractor shall initial the form and indicate the date work was completed. If the PM/CI concurs with the acceptance of the work, they will initial and date in the corresponding block.
9. Substantial completion will not be issued if there is a large number of punch list items or if there are major deficiencies with the work. If you have any questions regarding whether or not an item is major, or if there are a large number deficiencies, contact the Senior Project Manager.
10. Under no circumstances will final payment be made without documented completion of the Punch-List.



CITY OF FORT LAUDERDALE  
CONSTRUCTION AGREEMENT

THIS Agreement made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2024, by and between the City of Fort Lauderdale, a Florida municipal corporation ("City") and \_\_\_\_\_, a Florida company/corporation ("Contractor"), ("Party" or collectively "Parties");

WHEREAS, the City desires to retain a contractor for the Project as expressed in its Invitation to Bid Event No. 302, Project Number 12356, which was opened on \_\_\_\_\_; and

WHEREAS, the Contractor has expressed its willingness and capability to perform the necessary work to accomplish the Project;

NOW, THEREFORE, the City and the Contractor, in consideration of the mutual covenants and conditions contained herein and for other good and valuable consideration, the receipt and sufficiency is hereby acknowledged, agree as follows:

**ARTICLE 1 – DEFINITIONS**

Whenever used in this Agreement or in other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural forms:

- 1.1 Agreement – This written Agreement between the City and the Contractor covering the work to be performed including other Contract Documents that are attached to or incorporated in the Agreement.
- 1.2 Application for Payment – The form accepted by the City which is to be used by the Contractor in requesting progress or final payment and which is to include such supporting documentation as is required by the Contract Documents.
- 1.3 Approve – The word approve is defined to mean review of the material, equipment or methods for general compliance with design concepts and with the information given in the Contract Documents. It does not imply a responsibility on the part of the City to verify in every detail conformance with plans and specifications.
- 1.4 Bid – The offer or Bid of the Contractor submitted on the prescribed form setting forth the total prices for the Work to be performed.
- 1.5 Bid Documents – Advertisement for Invitation to Bids, the Instructions to Bidders, the Bid Form (with supplemental affidavits and sample agreements), the Contract Forms, General Conditions, the Supplementary Conditions, the Specifications, and the Plans, which documents all become an integral part of the Contract Documents.
- 1.6 Certificate of Substantial Completion – Certificate provided by the City certifying that all Work, excluding the punch list items, has been completed, inspected, and accepted by the City.
- 1.7 Change Order – A written document executed by both Parties ordering a change in the Contract Price or Contract Time or a material change in the Work.

- 1.8 City – The City of Fort Lauderdale, Florida, including but not limited to its employees, agents, officials, representatives, contractors, subcontractors, volunteers, successors and assigns, with whom the Contractor has entered into the Agreement and for whom the Work is to be provided.
- 1.9 Contract Documents – The Contract Documents shall consist of this Agreement, Exhibits to this Agreement, Public Construction Bond, Performance Bond, Payment Bond and Certificates of Insurance, Notice of Award and Notice to Proceed, General Conditions, Special Conditions, Technical Specifications, Plans/Drawings, Addenda, Bid Form and supplement Affidavits and Agreements, all applicable provisions of State and Federal Law and any modification, including Change Orders or written amendments duly delivered after execution of Agreement, Invitation to Bid, Instructions to Bidders and Bid Bond, Contractor's response to the City's Invitation to Bid, Schedule of Completion, Schedule of Values, all amendments, modifications and supplements, work directive changes issued on or after the Effective Date of the Agreement, as well as any additional documents that are required to be submitted under the Agreement.

Permits on file with the City and/or those permits to be obtained shall be considered directive in nature and will be considered a part of this Agreement. A copy of all permits shall be given to the City for inclusion in the Contract Documents. Terms of permits shall be met prior to acceptance of the Work and release of the final payment.

- 1.10 Contract Price – The amount established in the bid submittal and award by the City's City Commission, as may be amended by Change Order.
- 1.11 Contract Time – The number of calendar days stated in the Agreement for the completion of the Work. The dates on which the work shall be started and shall be completed as stated in the Notice to Proceed.
- 1.12 Contractor – The person, firm, company, or corporation with whom the City has entered into the Agreement, including but not limited to its employees, agents, representatives, contractors, subcontractors, their subcontractors and their other successors and assigns.
- 1.13 Day – A calendar day of twenty-four (24) hours ending at midnight.
- 1.14 Defective – When modifying the word "Work" refers to work that is unsatisfactory, faulty, or deficient, or does not conform to the Contract Documents or does not meet the requirements of any inspection, test or approval referred to in the Contract Documents, or has been damaged prior to the Project Manager's recommendation of final payment.
- 1.15 Effective Date of the Agreement – The effective date of the Agreement shall be the date the City Commission approves the work.
- 1.16 Final Completion Date – The date the Work is completed, including completion of the final punch list, and delivered along with those items specified in the Contract Documents and is accepted by the City.
- 1.17 Hazardous Materials (HAZMAT) – Any solid, liquid, or gaseous material that is toxic, flammable, radioactive, corrosive, chemically reactive, or unstable upon prolonged storage in quantities that could pose a threat to life, property, or the environment defined in Section

101(14) of Comprehensive Environmental Response, Compensation and Liability Act of 1980 and in 40 CFR 300.6. Also defined by 49 CFR 171.8 as a substance or material designated by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce and which has been so designated.

- 1.18 Hazardous Substance – As defined by Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act; any substance designated pursuant to Section 311(b) (2) (A) of the Clean Water Act; any element, compound, mixture, solution or substance designated pursuant to Section 102 identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act {but not including any waste listed under Section 307[a] of the Clean Water Act}; any hazardous air pollutant listed under Section 112 of the Clean Air Act; and any imminently hazardous chemical substance or mixture pursuant to Section 7 of the Toxic Substances Control Act. The term does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance in the first sentence of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).
- 1.19 Hazardous Waste – Those solid wastes designated by OSHA in accordance with 40 CFR 261 due to the properties of ignitability, corrosivity, reactivity, or toxicity. Any material that is subject to the Hazardous Waste Manifest requirements of the EPA specified in 40 CFR Part 262.
- 1.20 Holidays – Those designated non-workdays as established by the City Commission of the City of Fort Lauderdale.
- 1.21 Inspection – The term “inspection” and the act of inspecting as used in this Agreement is defined to mean the examination of construction to ensure that it conforms to the design concept expressed in the plans and specifications. This term shall not be construed to mean supervision, superintending and/or overseeing.
- 1.22 Notice of Award – The written notice by City to the Contractor stating that upon compliance by the Contractor with the condition’s precedent enumerated therein, within the time specified that the City will sign and deliver this Agreement.
- 1.23 Notice to Proceed – A written notice to Contractor authorizing the commencement of the activities identified in the notice or as described in the Contract Documents.
- 1.24 Plans – The official graphic representations of this Project that are a part of the Contract Documents.
- 1.25 Premises (otherwise known as Site or Work Site) – means the land, buildings, facilities, etc. upon which the Work is to be performed.
- 1.26 Project – The construction project described in the Contract Documents, including the Work described therein.
- 1.27 Project Manager – The employee of the City, or other designated individual who is herein referred to as the Project Manager, will assume all duties and responsibilities and will have the rights and authorities assigned to the Project Manager in the Contract Documents in

connection with completion of the Work in accordance with this Agreement. The Project Manager, or designee, shall be the authorized agent for the City unless otherwise specified.

- 1.28 Punch List – The City's list of Work yet to be done or be corrected by the Contractor, before the Final Completion date can be determined by the City.
- 1.29 Record Documents – A complete set of all specifications, drawings, addenda, modifications, shop drawings, submittals and samples annotated to show all changes made during the construction process.
- 1.30 Record Drawings or "As-Builts" – A set of drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the Contractor. These documents will be signed and sealed by a Professional Engineer, or a Professional Land Surveyor licensed in the State of Florida and employed by the Contractor at no cost to the City.
- 1.31 Substantially Completed Date – A date when written notice is provided by the City to the Contractor stating that the Work is substantially completed. If, at the time of inspection, it is determined the project is substantially completed, the City will also issue a letter of Substantial Completion along with a punch list of incomplete or deficient items to be completed prior to requesting a Final Completion inspection.
- 1.32 Work – The construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, materials, equipment, and services provided or to be provided by Contractor to fulfill Contractor's obligations. The Work may constitute the whole or a part of the Project.

## **ARTICLE 2 – SCOPE OF WORK**

- 2.1 The Contractor shall complete all Work as specified or indicated in the Contract Documents. The Project for which the Work under the Contract Documents may be the whole or only part is generally described as follows:

AES Facility Expansion  
ITB Event No. 302 Project No. 12356

- 2.2 All Work for the Project shall be constructed in accordance with the approved plans and Specifications. The Work generally involves:

### **PROJECT DESCRIPTION**

This Project is located at 2020 Executive Airport Way, Fort Lauderdale, FL 33309. Pursuant to the Project Manual and Drawings, the work includes, but is not limited to, furnish all materials, labor, and equipment to perform all the work to be accomplished under this contract, which includes renovations and expansion of the Fort Lauderdale Executive Airport (FXE) Aviation Equipment & Service (AES) Facility, including the construction of a two new bays and office space, new landscaping and irrigation, parking improvements, LED site lighting, replacement of the existing building flooring, upgrade the existing AES facility's lighting fixtures to a new LED fixtures, and painting of the existing AES (color scheme to be confirmed with FXE).

- 2.3 Within ten (10) days of the execution of this Agreement, the Contractor shall submit a Construction Schedule, Schedule of Values and a listing of all personnel employed. The general sequence of the Work shall be submitted by the Contractor and approved by the City before any work commences. The City reserves the right to issue construction directives necessary to facilitate the Work or to minimize any conflict with operations.

### **ARTICLE 3 – PROJECT MANAGER**

- 3.1 The Project Manager is hereby designated by the City as Khant Myat, P.E., whose address is 6000 NW 21<sup>ST</sup> Avenue, Fort Lauderdale, FL 33309, telephone number: (954) 828-5061, and email address is [kmyat@fortlauderdale.gov](mailto:kmyat@fortlauderdale.gov). The Project Manager will assume all duties and responsibilities and will have the rights and authorities assigned to the Project Manager in the Contract Documents in connection with completion of the Work in accordance with this Agreement.

### **ARTICLE 4 – CONTRACT DOCUMENTS**

The Contract Documents, which comprise the entire Agreement between the City and Contractor, are incorporated herein and attached to this Agreement, and consist of the following:

- 4.1 This Agreement.
- 4.2 Exhibits to this Agreement: (Plans sheets [ ] to [ ] inclusive).
- 4.3 Public Construction Bond, Performance Bond, Payment Bond and Certificates of Insurance.
- 4.4 Notice of Award and Notice to Proceed.
- 4.5 General Conditions and Special Conditions.
- 4.6 Technical Specifications.
- 4.7 Plans/Drawings.
- 4.8 Addenda number \_\_\_\_\_ through \_\_\_\_\_, inclusive.
- 4.9 Bid Form and supplement Affidavits and Agreements.
- 4.10 All applicable provisions of State and Federal Law.
- 4.11 Invitation to Bid Event No. 302, Instructions to Bidders, and Bid Bond.
- 4.12 Contractor's response to the City's Invitation to Bid Event No. 302, dated \_\_\_\_\_.
- 4.13 Schedule of Completion.
- 4.14 All amendments, modifications and supplements, change orders and work directive changes, issued on or after the Effective Date of the Agreement.
- 4.15 Any additional documents that are required to be submitted under the Agreement.

4.16 Permits on file with the City and or those permits to be obtained shall be considered directive in nature and will be considered a part of this Agreement.

In the event of any conflict between the documents or any ambiguity or missing specification or instruction, the following priority is established:

- a. Approved change orders, addenda or amendments.
- b. Specifications and Drawings.
- c. Special Conditions.
- d. General Conditions.
- e. This Agreement dated \_\_\_\_\_, and any attachments.
- f. Invitation to Bid Event No. 302, and the specifications prepared by the City.
- g. Contractor's response to the City's Invitation to Bid Event No. 302, dated \_\_\_\_\_.
- h. Schedule of Values.
- i. Schedule of Completion.

If during the performance of the Work, Contractor finds a conflict, error or discrepancy in the Contract Documents, Contractor shall so report to the Project Manager, in writing, within five (5) calendar days, and before proceeding with the Work affected shall obtain a written interpretation or clarification from the City.

Any Work that may reasonably be inferred from the specifications or plans as being required to produce the intended result shall be supplied whether or not it is specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials, or equipment, such works shall be interpreted in accordance with such meaning. Reference to standard specifications, manuals or codes of any technical society, organization or associations, or to the code of any governmental authority whether such reference be specific or implied, shall mean the latest standard specification, manual or code in effect as of the Effective Date of this Agreement, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of the City, the Contractor, or any of their agents or employees from those set forth in the Contract Documents.

## ARTICLE 5 – CONTRACT TIME

- 5.1 The Contractor recognizes that **TIME IS OF THE ESSENCE**. The Work shall commence within **ten (10)** calendar days of the date of the Notice to Proceed.
- 5.2 The Work shall be Substantially Completed within **two hundred sixty (260)** calendar days after the date when the Contract Time commences to run as provided in the Notice to Proceed.

- 5.3 The Work shall be finally completed on the Final Completion Date and ready for final payment in accordance with this Agreement within **three hundred five (305)** calendar days after the date when the Contract Time commences to run as provided in the Notice to Proceed.

## **ARTICLE 6 – CONTRACT PRICE**

- 6.1 City shall pay Contractor for performance of the Work in accordance with Article 7, subject to additions and deletions by Change Order, as provided for in this Agreement.
- 6.2 The Parties expressly agree that the Contract Price, which shall not exceed the amount of \$ [REDACTED], constitutes the total maximum compensation payable to Contractor for performing the Work, plus any Work done pursuant to a Change Order. The Contract Price is in accordance with the line items unit prices listed in the Bid. Line items are based on a unit price cost multiplied by a defined quantity. Any additional duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change to the Contract Price.
- 6.3 The Contract Price constitutes the compensation payable to Contractor for performing the Work plus any Work done pursuant to a Change Order. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract Price.

## **ARTICLE 7 – PAYMENT**

- 7.1 Contractor shall submit Applications for Payment in accordance with the Contract Documents. Applications for Payment will be processed by City as provided for in the General Conditions.
- 7.2 Progress Payments. City shall make progress payments on account of the Contract Price on the basis of Contractor's monthly Applications for Payment, which shall be submitted by the Contractor between the first (1<sup>st</sup>) and the tenth (10<sup>th</sup>) day after the end of each calendar month for which payment is requested. All progress payments will be made on the basis of the progress of the Work completed.
- 7.3 Prior to Final Completion, progress payments will be made in an amount equal to ninety-five percent (95%) of the value of Work completed less in each case the aggregate of payments previously made.
- 7.4 Final Payment. Upon final completion of the Work in accordance with the General Conditions, as may be supplemented, the City shall pay Contractor an amount sufficient to increase total payments to one hundred percent (100%) of the Contract Price. However, not less than five percent (5%) of the Contract Price shall be retained until Record Drawings (as-builts), specifications, addenda, modifications, and shop drawings, including all manufacturers' instructional and parts manuals are delivered to and accepted by the City.
- 7.5 City may withhold, in whole or in part, payment to such extent as may be necessary to protect itself from loss on account of:
- 7.5.1 Defective work not remedied.

- 7.5.2 Claims filed or reasonable evidence indicating probable filing of claims by other parties against Contractor or City because of Contractor's performance.
- 7.5.3 Failure of Contractor to make payments properly to subcontractors or for material or labor.
- 7.5.4 Damage to another contractor not remedied.
- 7.5.5 Liquidated damages and costs incurred by Consultant for extended construction administration, if applicable.
- 7.5.6 Failure of Contractor to provide any and all documents required by the Contract Documents.

When the above grounds are removed or resolved satisfactory to the Project Manager, payment shall be made in whole or in part.

- 7.6 The City shall make payment to the Contractor in accordance with the Florida Prompt Payment Act, Section 218.70, Florida Statutes (2022), as amended or revised, provided, however, complete and error free pay application is submitted.
- 7.7 The City shall make payment to the Contractor through utilization of the City's Purchasing Card (P-Card) Program. The City has implemented a P-Card Program utilizing the MASTERCARD and VISA networks. Purchases from this contract will be made utilizing the City's P-Card. Contractor will receive payment from the purchasing card in the same manner as other credit card purchases. Accordingly, Contractor must presently have the ability to accept these credit cards or take whatever steps necessary to implement the ability before the start of the contract term, or contract award by the City. All costs associated with the Contractor's participation in this purchasing program shall be borne by the Contractor. The City reserves the right to revise this program as necessary.
- 7.8 Payment Card Industry (PCI) Compliance:

Contractor agrees to comply with all applicable state, federal and international laws, as well as industry best practices, governing the collection, access, use, disclosure, safeguarding and destruction of Protected Information.

Contractor and/or any subcontractor that handles credit card data must be, and remain, PCI compliant under the current standards and will provide documentation confirming compliance upon request by the City of Fort Lauderdale. Failure to produce documentation could result in termination of the contract.

## **ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS**

In order to induce the City to enter into this Agreement, Contractor makes the following representations upon which the City has relied:

- 8.1 Contractor is qualified in the field of public construction and in particular to perform the Work and services set forth in this Agreement.



- 8.2 Contractor has visited the Work Site, has conducted extensive tests, examinations and investigations and represents and warrants a thorough familiarization with the nature and extent of the Contract Documents, the Work, locality, soil conditions, water table condition, moisture conditions and all year-round local weather and climate conditions (past and present), and examination and investigations conducted by Contractor and the Contractor's experts, has determined that no conditions exist that would in any manner affect the Bid Price and that the project can be completed for the Bid Price submitted within the Contract Time as defined in this Agreement.

Furthermore, Contractor warrants and confirms that it is totally familiar with, understands and obligates Contractor to comply with all federal, state and local laws, ordinances, rules, regulations and all market conditions that affect or may affect the cost and price of materials and labor needed to fulfill all provisions of this Agreement or that in any manner may affect cost, progress or performance of the Work.

- 8.3 The Contractor has satisfied itself as to the nature and location of the Work under the Contract Documents, the general and local conditions of the Project, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, and roads, the conformation and conditions at the ground based on City provided reports, the type of equipment and facilities needed preliminary to and during the prosecution of the Work and all other matters which can in any way affect the Work or the cost thereof under the Contract Documents.
- 8.4 The Contractor has also studied on its own, investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Works, and finds and has further determined that no conditions exist that would in any manner affect the Bid Price and that the Project can be completed for the Bid Price submitted.
- 8.5 Contractor has made or caused to be made, examinations, investigations, tests and studies of such reports and related data in addition to those referred to in Paragraphs 8.2, 8.3 and 8.4 above as it deems necessary for the performance of the Work at the Contract Prices, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, tests, reports or similar data are, or will be, required by Contractor for such purposes.
- 8.6 Contractor has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.
- 8.7 Contractor has given City written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution by City is acceptable to the Contractor.

8.8 Labor:

- 8.8.1 The Contractor shall provide competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. The Contractor shall at all times maintain good discipline and order at the site.
- 8.8.2 The Contractor shall, at all times, have a competent superintendent, capable of reading and thoroughly understanding the drawings and specifications, as the

Contractor's agent on the Work, who shall, as the Contractor's agent, supervise, direct and otherwise conduct the Work.

8.8.3 The Contractor shall designate the superintendent on the job to the City, in writing, immediately after receipt of the Notice to Proceed. The Contractor understands and agrees that the superintendent's physical presence on the job site is indispensable to the successful completion of the Work. If the superintendent is frequently absent from the job site, the Project Manager may deliver written notice to the Contractor to stop work or terminate the Agreement in accordance with Article 17.

8.8.4 Where required and necessary, the Contractor shall, at all times, have a certified "competent person" assigned to the job site. The Contractor shall assign personnel to the job site that have successfully completed training programs related to trench safety, confined space work, and maintenance of traffic (MOT). Personnel certified by the International Municipal Signal Associations with Florida Department of Transportation qualifications are required relative to MOT. Any other certifications that may be required by applicable permitting agencies for the Work shall also be complied with by the Contractor. Failure to pursue the Work with the properly certified supervisory staff may result in notice to stop work or terminate the Agreement in accordance with Article 17.

#### 8.9 Materials:

8.9.1 The Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of Work.

8.9.2 All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. Suppliers shall be selected and paid by the Contractor; the City reserves the right to approve all suppliers and materials.

8.10 Work Hours: Except in connection with the safety or protection of persons, or the Work, or property at the site or adjacent thereto, and except as otherwise indicated in the Supplementary Conditions, all work at the site shall be performed during regular working hours between 8 a.m. and 5:00 p.m., Monday through Friday.

Unless approved by the City in advance, the Contractor will not perform work on Saturday, Sunday or any legal holiday (designated by the City of Fort Lauderdale) without the Project Manager's written consent at least seventy-two (72) hours in advance of starting such work. For any overtime inspection required by City personnel, the Contractor shall pay for the additional charges to the City with respect to such overtime work. Such additional charges shall be a subsidiary obligation of the Contractor and no extra payment shall be made to the Contractor for overtime work. **It shall be noted that the City's Inspector work hours are from 8:00 a.m. to 4:30 p.m., Monday through Friday, and any work requiring inspection oversight being performed outside of this timeframe shall be paid for by the Contractor as Inspector overtime at a rate of \$100.00 per hour.** The cost to the Contractor to reimburse the City for overtime inspection is established at direct-labor and overtime costs for each person or inspector required. Incidental overtime costs for engineering, testing and other related services will also be charged to the Contractor at the actual rate accrued.

8.11 Patent Fee and Royalties: The 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, or any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. The Contractor hereby expressly binds itself to indemnify and hold harmless the City from all such claims and fees and from any and all suits and action of every name and description that may be brought against City on account of any such claims, fees, royalties, or costs for any such invention or patent, and from any and all suits or actions that may be brought against said City for the infringement of any and all patents or patent rights claimed by any person, firm corporation or other entity.

8.12 Permits: The Contractor shall obtain and pay for all permits and licenses. There shall be no allowance for Contractor markup, overhead or profit for permits and licenses.

The Contractor shall pay all government charges which are applicable at the time of opening of bids. It shall be the responsibility of the Contractor to secure and pay for all necessary licenses and permits of a temporary nature necessary for the prosecution of Work.

8.13 Law and Regulations: The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations applicable to the Work. If the Contractor observes that the specifications or plans are in conflict, the Contractor shall give the Project Manager prompt written notice thereof within five (5) calendar days, and any necessary changes shall be adjusted by any appropriate modifications. If the Contractor performs any work knowing or having reason to know that it is contrary to such laws, ordinances, rules, standards, specifications and regulations, and without such notice to the Project Manager, the Contractor shall bear all costs arising therefrom.

8.14 Taxes: The Contractor shall pay all sales, consumer, use and other similar taxes required to be paid by him in accordance with the laws of the City of Fort Lauderdale, County of Broward, and the State of Florida.

8.15 Contractor Use of Premises: The Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workmen to areas permitted by law, ordinances, permits and/or the requirements of the Contract Documents, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment.

The Contractor shall not enter upon private property for any purpose without first securing the permission of the property owner in writing and furnishing the Project Manager with a copy of said permission. This requirement will be strictly enforced, particularly with regard to such vacant properties as may be utilized for storage or staging by the Contractor.

The Contractor shall conduct its work in such a manner as to avoid damage to adjacent private or public property. Any damage to existing structures of work of any kind, including permanent reference markers or property corner markers, or the interruption of a utility service, shall be repaired or restored promptly at no expense to the City or property owner.

The Contractor will preserve and protect all existing vegetation such as trees, shrubs and grass on or adjacent to the site which do not reasonably interfere with the construction, as determined by the Project Manager. The Contractor will be responsible for repairing or

replacing any trees, shrubs, lawns and landscaping that may be damaged due to careless operation of equipment, stockpiling of materials, tracking of grass by equipment or other construction activity. The Contractor will be liable for or will be required to replace or restore at no expense to the City all properties and areas not protected or preserved as required herein that may be destroyed or damaged.

During the progress of the Work, the Contractor shall keep the premises free from accumulation of waste materials, rubbish and debris resulting from the Work. At the completion of the Work, the Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials and shall leave the site clean and ready for occupancy by the City. The Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents at no cost to the City.

8.16 Project Coordination: The Contractor shall provide for the complete coordination of the construction effort. This shall include, but not necessarily be limited to, coordination of the following:

8.16.1 Flow of material and equipment from suppliers.

8.16.2 The interrelated work with affected utility companies.

8.16.3 The interrelated work with the City where tie-ins to existing facilities are required.

8.16.4 The effort of independent testing agencies.

8.16.5 Notice to affected property owners as may be directed by the Project Manager.

8.16.6 Coordination with and scheduling of all required inspections from all permitting agencies.

8.17 Project Record Documents and Final As-Builts (Record Drawings): Contractor shall be responsible for maintaining up-to-date redline as-built drawings, on site, at all times during construction. All as-built information shall be surveyed and verified by a professional land surveyor registered in the State of Florida. Contractor shall provide the City with a minimum of three (3) sets of signed and sealed record drawings (Final As-Builts) and a CD of the electronic drawings files created in AutoCAD 2014 or later. All costs associated with survey work required for construction layout and as-built preparation shall be the responsibility of the Contractor.

8.18 Safety and Protection:

8.18.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

8.18.1.1 All employees working on the project and other persons who may be affected thereby.

8.18.1.2 All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site.

8.18.1.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

8.18.2 The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and utilities when execution of the Work may affect them at least seventy-two (72) hours in advance (unless otherwise required). All damage, injury or loss to any property caused, directly or indirectly, in whole or in part by the Contractor, any subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, shall be remedied by the Contractor. The Contractor's duties and responsibilities for safety and protection of the Work shall continue until such time as all the Work is completed and accepted by the City.

8.19 Emergencies: In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the City, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Project Manager prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused thereby.

8.20 Risk of Loss: The risk of loss, injury or destruction shall be on the Contractor until acceptance of the Work by the City. Title to the Work shall pass to the City upon acceptance of the Work by the City.

8.21 Environmental: The Contractor has fully inspected the Premises and agrees, except as to the presence of any asbestos, to accept the Premises in an "as is" physical condition, without representation or warranty by the City of any kind, including, without limitation, any and all existing environmental claims or obligations that may arise from the presence of any "contamination" on, in or about the Premises. Further, Contractor and all entities claiming by, through or under the Contractor, releases and discharges the City from any claim, demand, or cause of action arising out of or relating to the Contractor's use, handling, storage, release, discharge, treatment, removal, transport, decontamination, cleanup, disposal and/or presence of any hazardous substances including asbestos on, under, from or about the Premises. The Contractor shall have no liability for any pre-existing claims or "contamination" on the Premises.

The Contractor shall not use, handle, store, discharge, treat, remove, transport, or dispose of Hazardous Substances including asbestos at, in, upon, under, to or from the Premises until receipt of instructions from the City. At such time, a City approved Change Order, which shall not include any profit, shall authorize the Contractor to perform such services.

The Contractor shall immediately deliver to the Project Manager complete copies of all notices, demands, or other communications received by the Contractor from any governmental or quasi-governmental authority or any insurance company or board of fire

underwriters or like or similar entities regarding in any way alleged violations or potential violations of any Environmental Law or otherwise asserting the existence or potential existence of any condition or activity on the Premises which is or could be dangerous to life, limb, property, or the environment.

For other and additional consideration, the Contractor hereby agrees, at its sole cost and expense, to indemnify and protect, defend, and hold harmless the City and its respective employees, agents, officials, officers, representatives, contractors and subcontractors, successors, and assigns (hereafter the "City") from and against any and all claims, demands, losses, damages, costs, expenses, including but not limited to mitigation, restoration, and natural restoration expenses, liabilities, assessments, fines, penalties charges, administrative and judicial proceedings and orders, judgments, causes of action, in law or in equity, remedial action requirements and/or enforcement actions of any kind (including, without limitation, attorneys' fees and costs) directly or indirectly arising out of or attributable to, in whole or in part, the Contractor's use, handling, storage, release, threatened release, discharge, treatment, removal, transport, decontamination, cleanup, disposal and/or presence of a Hazardous Substance (excluding asbestos) on, under, from, to or about the Premises or any other activity carried on or undertaken on or off the Premises by the Contractor or its employees, agents or subcontractors, in connection with the use, handling, storage, release, threatened release, discharge, treatment, mitigation, natural resource restoration, removal, transport, decontamination, cleanup, disposal and/or presence of any Hazardous Substance including asbestos located, transported, or present on, undue, from, to, or about the Premises. This indemnity is intended to be operable under 42 U.S.C. Section 9607, as amended or revised, and any successor section.

The scope of the indemnity obligations includes, but is not limited to: (a) all consequential damages; (b) the cost of any required or necessary repair, cleanup, or detoxification of the applicable real estate and the preparation and implementation of any closure, remedial or other required plan, including without limitation; (i) the costs of removal or remedial action incurred by the United States government or the State of Florida or response costs incurred by any other person, or damages from injury to destruction of, or loss of, natural resources, including the cost of assessing such injury, destruction, or loss, incurred pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, as amended; (ii) the clean-up costs, fines, damages, or penalties incurred pursuant to any applicable provisions of Florida law; and (iii) the cost and expenses of abatement, correction or cleanup, fines, damages, response costs, or penalties which arise from the provisions of any other statute, law, regulation, code ordinance, or legal requirement state or federal; and (c) liability for personal injury or property damage arising under any statutory or common law tort theory, including damages assessed for the maintenance of a public private nuisance, response costs, or for the carrying on of an abnormally dangerous activity.

8.22 No Extended Damages: For other and additional good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the Contractor covenants and agrees that in the event of any delay of construction or for any other reason or allegation or claim, and notwithstanding the reason of the delay, reason, claim or allegation or who caused them or the construction delay or whether they were caused by the City, that there will be no entitlement to Contractor to or for any direct or indirect financial damages or losses for extended corporate overhead impact, extended project overhead impacts, project support services, mobilization or demobilization or by whatever other label or legal concept or theory and types of names or labels or basis such claims may have, or any

business damages or losses of whatever type or nature, and Contractor hereby waives any right to make any such claim or claims. This provision will have application and effect when construction delays are anticipated and agreed upon by both the City and the Contractor.

- 8.23 No Liens: If any subcontractor, supplier, laborer, or materialmen of Contractor or any other person directly or indirectly acting for or through Contractor files or attempts to file a mechanic's or construction lien against the real property on which the Work is performed or any part or against any personal property or improvements or claim against any monies due or to become due from the City to Contractor or from Contractor to a subcontractor, for or on account of any work, labor, services, material, equipment, or other items furnished in connection with the Work or any Change Order, Contractor agrees to satisfy, remove, or discharge such lien or claim at its own expense by bond, payment, or otherwise within twenty (20) days of the filing or from receipt of written notice from the City.

Additionally, until such time as such lien or claim is satisfied, removed or discharged by Contractor, all monies due to Contractor, or that become due to Contractor before the lien or claim is satisfied, removed or otherwise discharged, shall be held by City as security for the satisfaction, removal and discharge of such lien and any expense that may be incurred while obtaining such. If Contractor shall fail to do so, City shall have the right, in addition to all other rights and remedies provided by this Agreement or by law, to satisfy, remove, or discharge such lien or claim by whatever means City chooses at the entire and sole cost and expense of Contractor which costs and expenses shall, without limitation, include attorney's fees, litigation costs, fees and expenses and all court costs and assessments.

- 8.24 Weather Emergencies: Upon issuance of a hurricane watch by the National Weather Service, the Contractor shall submit to the City a plan to secure the work area in the event a hurricane warning is issued. The plan shall detail how the Contractor will secure the Premises, equipment and materials in a manner as to prevent damage to the Work and prevent materials and equipment from becoming a hazard to persons and property on and around the Premises. The plan shall include a time schedule required to accomplish the hurricane preparations and a list of emergency contacts that will be available, and in the City before, during and immediately after the storm.

Upon issuance of a hurricane warning by the National Weather Service, if the Contractor has not already done so, the Contractor shall implement its hurricane preparedness plan. Cost of development and implementation of the hurricane preparedness plan shall be considered as incidental to construction. Cost of any clean up and rework required after the storm will be considered normal construction risk within Florida and shall not entitle the Contractor to any additional compensation. Contractor shall be entitled to request an extension in time for completion of the Work, in accordance with the provisions of Article 15 of this Agreement, equal to the time it is shut down for implementation of the preparedness plan, the duration of the storm and a reasonable period to restore the Premises.

- 8.25 Force Majeure: No Party shall hold the other responsible for damages or for delays in performance caused by force majeure, acts of God, or other acts or circumstances beyond the control of the other Party or that could not have been reasonably foreseen and prevented. For this purpose, such acts or circumstances shall include, but not be limited to weather conditions affecting performance, floods, epidemics, pandemics, war, act of Governmental Authority, state of emergency, riots, strikes, lockouts, or other industrial disturbances, or protest demonstrations. Should such acts or circumstances occur, the

Parties shall use their best efforts to overcome the difficulties arising therefrom and to resume the Work as soon as reasonably possible with the normal pursuit of the Work.

Inclement weather, continuous rain for less than three (3) days or the acts or omissions of subcontractors, third-party contractors, materialmen, suppliers, or their sub-contractors, shall not be considered acts of force majeure.

No Party shall be liable for its failure to carry out its obligations under the Agreement during a period when such Party is rendered unable by force majeure to carry out its obligation, but the obligation of the Party or Parties relying on such force majeure shall be suspended only during the continuance of the inability and for no longer period than the unexpected or uncontrollable event.

The Contractor further agrees and stipulates, that its right to excuse its failure to perform by reason of force majeure shall be conditioned upon giving written notice of its assertion that a Force Majeure delay has commenced within ninety-six (96) hours after such an occurrence. The Contractor shall use its reasonable efforts to minimize such delays. The Contractor shall promptly provide an estimate of the anticipated additional time required to complete the Project.

- 8.26 Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assisted Contracts: The recipient shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of any DOT-assisted contract or in the administration of its DBE program or the requirements of 49 CFR Part 26. The recipient shall take all necessary and reasonable steps under 49 CFR Part 26 to ensure nondiscrimination in the award and administration of DOT-assisted contracts. The recipient's DBE program, as required by 49 CFR Part 26 and as approved by DOT, is incorporated by reference in this Agreement. Implementation of this program is a legal obligation and failure to carry out its terms shall be treated as a violation of this Agreement. Upon notification to the recipient of its failure to carry out its approved program, the Department may impose sanctions as provided for under Part 26 and may, in appropriate cases, refer the matter for enforcement under 18 U.S.C. 1001 and/or the Program Fraud Civil Remedies Act of 1986 (31 U.S.C. 3801 *et seq.*).

Additionally, the Contractor assures that it, the sub-recipient or its subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Agreement. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this Agreement, which may result in the termination of this Agreement or such other remedy as the recipient deems appropriate. This additional language must be included in each subcontract the prime Contractor signs with a subcontractor.

## **ARTICLE 9 – CITY’S RESPONSIBILITIES**

- 9.1 The City shall furnish the data required of the City under the Contract Documents promptly and shall make payments to the Contractor promptly after they are due as provided in Article 7.
- 9.2 The City shall provide public rights-of-way and easement, where available, for the installation of conduits, transformers pads and related appurtenances only.



### 9.3 Technical Clarifications and Interpretations:

9.3.1 The City shall issue, with reasonable promptness, such written clarifications or interpretations of the Contract Documents as it may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. Should the Contractor fail to request interpretation of questionable items in the Contract Documents, the City shall not entertain any excuse for failure to execute the Work in a satisfactory manner.

9.3.2 The City shall interpret and decide matters concerning performance under the requirements of the Contract Documents, and shall make decisions on all claims, disputes or other matters in question. Written notice of each claim, dispute or other matter will be delivered by claimant to the other Party but in no event later than five (5) days after the occurrence of event and written supporting data will be submitted to the other Party within five (5) days after such occurrence. All written decisions of the City on any claim or dispute will be final and binding.

9.4 The Contractor shall perform all Work to the reasonable satisfaction of the City in accordance with the Contract Documents. In cases of disagreement or ambiguity, the City shall decide all questions, difficulties, and disputes of whatever nature, which may arise under or by reason of this Agreement or the quality, amount and value of the Work, and the City's decisions on all claims, questions and determination are final.

9.5 Cancellation for Unappropriated Funds: The obligation of the City for payment to a Contractor is limited to the availability of funds appropriated in a current fiscal period, and continuation of the Agreement into a subsequent fiscal period is subject to appropriation of funds, unless otherwise authorized by law.

## **ARTICLE 10 – BONDS AND INSURANCE**

10.1 Public Construction and Other Bonds: The Contractor shall furnish Public Construction or Performance and Payment Bonds ("Bond"), each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all the Contractor's obligations under the Contract Documents. These Bonds shall remain in effect until at least one (1) year after the date of final payment, except as otherwise provided by law. All Bonds shall be furnished and provided by the surety and shall be in substantially the same form as prescribed by the Contract Documents and be executed by such sureties as (i) are licensed to conduct business in the State of Florida, and (ii) are named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department and (iii) otherwise meet the requirements set forth herein that apply to sureties. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act.

10.1.1 Performance Bond: The Contractor shall execute and record in the public records of Broward County, Florida, a payment and performance bond in an amount at least equal to the Contract Price with a surety insurer authorized to do business in the State of Florida as surety, ("Bond"), in accordance with Section 255.05, Florida Statutes (2022), as may be amended or revised, as security for the faithful

performance and payment of all of the Contractor's obligations under the Contract Documents.

A Corporate Surety Bond legally issued, meeting the approval of, and running to the City in an amount not less than the Contract Price of such improvements, conditioned that the Contractor shall maintain and make all repairs to the improvements constructed by the Contractor at their own expense and free of charge to the City, for the period of one (1) year after the date of acceptance of the Work within such period by reason of any imperfection of the material used or by reason of any defective workmanship, or any improper, imperfect or defective preparation of the base upon which any such improvement shall be laid.

10.2 Disqualification of Surety: If the Surety on any Bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in the State of Florida or it ceases to meet the requirements of clauses (i) and (ii) of Paragraph 10.1, the Contractor shall within five (5) days thereafter substitute another Bond and Surety, both of which shall be acceptable to the City.

10.3 Insurance:

As a condition precedent to the effectiveness of this Agreement, during the term of this Agreement and during any renewal or extension term of this Agreement, OBTLIC shall cause the OB Contractor, at its sole expense, to provide insurance of such types and with such terms and limits as noted below. Providing proof of and maintaining adequate insurance coverage are material obligations of Contractor. Contractor shall provide the City a certificate of insurance evidencing such coverage. Contractor's insurance coverage shall be primary insurance for all applicable policies, in respect to the City's interests. The limits of coverage under each policy maintained by Contractor shall not be interpreted as limiting Contractor's liability and obligations under this Agreement. All insurance policies shall be through insurers authorized or eligible to write policies in the State of Florida and possess an A.M. Best rating of A-, VII or better, subject to approval by the City's Risk Manager.

The coverages, limits, and/or endorsements required herein protect the interests of the City, and these coverages, limits, and/or endorsements shall in no way be relied upon by Contractor for assessing the extent or determining appropriate types and limits of coverage to protect Contractor against any loss exposures, whether as a result of this Agreement or otherwise. The requirements contained herein, as well as the City's review or acknowledgement, are not intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by Contractor under this Agreement.

The following insurance policies and coverages are required:

Commercial General Liability

Coverage must be afforded under a Commercial General Liability policy with limits not less than:

- \$1,000,000 each occurrence and \$2,000,000 aggregate for Bodily Injury, Property Damage, and Personal and Advertising Injury
- \$1,000,000 each occurrence and \$2,000,000 aggregate for Products and Completed Operations

Policy must include coverage for contractual liability and independent contractors.

The City, a Florida municipality, its officials, employees, and volunteers are to be included as an additional insured with a CG 20 26 04 13 Additional Insured – Designated Person or Organization

Endorsement or similar endorsement providing equal or broader Additional Insured Coverage with respect to liability arising out of activities performed by or on behalf of Contractor. The coverage shall contain no special limitation on the scope of protection afforded to the City, its officials, employees, and volunteers.

Pollution and Remediation Legal Liability (Hazardous Materials)

For the purpose of this section, the term "hazardous materials" includes all materials and substances that are designated or defined as hazardous by Florida or federal law or by the rules or regulations of Florida or any federal agency. If work being performed involves hazardous materials, Contractor shall procure and maintain any or all of the following coverages (which will be specifically addressed upon review of exposure):

Contractors Pollution Liability Coverage

For sudden and gradual occurrences and in an amount not less than \$1,000,000 per claim arising out of this Agreement, including but not limited to, all hazardous materials identified under the Agreement.

Business Automobile Liability

Coverage must be afforded for all Owned, Hired, Scheduled, and Non-Owned vehicles for Bodily Injury and Property Damage in an amount not less than \$1,000,000 combined single limit each accident.

If Contractor does not own vehicles, Contractor shall maintain coverage for Hired and Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Liability policy.

Crane and Rigging Liability (if applicable to work being completed under this contract)

Coverage must be afforded for any crane operations under the Commercial General or Business Automobile Liability policy as necessary, in line with the limits of the associated policy

Workers' Compensation and Employer's Liability

Coverage must be afforded per Chapter 440, Florida Statutes. Any person or entity performing work for or on behalf of the City must provide Workers' Compensation insurance. Exceptions and exemptions will be allowed by the City's Risk Manager, if they are in accordance with Florida Statute.

Contractor waives, and Contractor shall ensure that Contractor's insurance carrier waives, all subrogation rights against the City, its officials, employees, and volunteers for all losses or damages. The City requires the policy to be endorsed with WC 00 03 13 Waiver of our Right to Recover from Others or equivalent.

Contractor must be in compliance with all applicable State and federal workers' compensation laws, including the U.S. Longshore and Harbor Workers' Compensation Act and the Jones Act, if applicable.

Insurance Certificate Requirements

- i. Contractor shall provide the City with valid Certificates of Insurance (binders are unacceptable) no later than ten (10) days prior to the start of work contemplated in this Agreement.
- j. Contractor shall provide to the City a Certificate of Insurance having a thirty (30) day notice of cancellation; ten (10) days' notice if cancellation is for nonpayment of premium.
- k. In the event that the insurer is unable to accommodate the cancellation notice requirement, it shall be the responsibility of Contractor to provide the proper notice. Such notification will

be in writing by registered mail, return receipt requested, and addressed to the certificate holder.

- l. In the event the Agreement term or any surviving obligation of Contractor following expiration or early termination of the Agreement goes beyond the expiration date of the insurance policy, Contractor shall provide the City with an updated Certificate of Insurance no later than ten (10) days prior to the expiration of the insurance currently in effect. The City reserves the right to suspend the Agreement until this requirement is met.
- m. The Certificate of Insurance shall indicate whether coverage is provided under a claims-made or occurrence form. If any coverage is provided on a claims-made form, the Certificate of Insurance must show a retroactive date, which shall be the effective date of the initial contract or prior.
- n. The City shall be included as an Additional Insured on all liability policies, with the exception of Workers' Compensation.
- o. The City shall be granted a Waiver of Subrogation on Contractor's Workers' Compensation insurance policy.
- p. The title of the Agreement, Bid/Contract number, event dates, or other identifying reference must be listed on the Certificate of Insurance.

The Certificate Holder should read as follows:

City of Fort Lauderdale  
401 SE 21<sup>st</sup> Street  
Fort Lauderdale, FL 33316

Contractor has the sole responsibility for all insurance premiums and shall be fully and solely responsible for any costs or expenses as a result of a coverage deductible, co-insurance penalty, or self-insured retention; including any loss not covered because of the application of such deductible, co-insurance penalty, self-insured retention, or coverage exclusion or limitation. Any costs for adding the City as an Additional Insured shall be at Contractor's expense.

If Contractor's primary insurance policy/policies do not meet the minimum requirements as set forth in this Agreement, Contractor may provide evidence of an Umbrella/Excess insurance policy to comply with this requirement.

Contractor's insurance coverage shall be primary insurance in respect to the City's interests, a Florida municipality, its officials, employees, and volunteers. Any insurance or self-insurance maintained by the City shall be non-contributory.

Any exclusion or provision in any insurance policy maintained by Contractor that excludes coverage required in this Agreement shall be deemed unacceptable and shall be considered breach of contract.

All required insurance policies must be maintained until the Agreement work has been accepted by the City, or until this Agreement is terminated, whichever is later. Any lapse in coverage may be considered breach of contract. In addition, Contractor must provide to the City confirmation of coverage renewal via an updated certificate of insurance should any policies expire prior to the expiration of this Agreement. The City reserves the right to review, at any time, coverage forms and limits of Contractor's insurance policies.

Contractor shall provide notice of any and all claims, accidents, and any other occurrences associated with this Agreement to Contractor's insurance company or companies and the City's Risk Management office as soon as practical.

It is Contractor's responsibility to ensure that any and all of Contractor's independent contractors and subcontractors comply with these insurance requirements. All coverages for independent contractors and subcontractors shall be subject to all of the applicable requirements stated herein. Any and all deficiencies are the responsibility of Contractor. The City reserves the right to adjust insurance limits from time to time at its discretion with notice to Contractor.

**NOTE: CITY PROJECT NUMBER, PROJECT NAME AND BID NUMBER MUST APPEAR ON EACH CERTIFICATE, AND THE CITY OF FORT LAUDERDALE MUST BE NAMED ON THE CERTIFICATE AS AN "ADDITIONAL INSURED" ON REQUIRED LIABILITY POLICIES.**

**A Sample Insurance Certificate shall be included with the bid to demonstrate the firm's ability to comply with insurance requirements. Provide a previous certificate or other evidence listing the insurance companies' names for all required coverage, and the dollar amounts of the coverage.**

#### **ARTICLE 11 – WARRANTY AND GUARANTEE, TESTS AND INSPECTIONS, CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

- 11.1 Warranty: The Contractor warrants and guarantees to the City that all Work will be in accordance with the Contract Documents and will not be defective. Prompt notice of all defects shall be given to the Contractor. All defective work, whether or not in place, may be rejected, corrected or accepted as provided in this Article.
- 11.1.1 Warranty of Title: The Contractor warrants to the City that it possesses good, clear and marketable title to all equipment and materials provided and that there are no pending liens, claims or encumbrances against the equipment and materials.
- 11.1.2 Warranty of Specifications: The Contractor warrants that all equipment, materials and workmanship furnished, whether furnished by the Contractor, its subcontractors or suppliers, will comply with the specifications, drawings and other descriptions supplied or adopted and that all services will be performed in a workmanlike manner.
- 11.1.3 Warranty of Merchantability: The Contractor warrants that any and all equipment to be supplied pursuant to this Agreement is merchantable, free from defects, whether patent or latent in material or workmanship, and fit for the ordinary purposes for which it is intended.
- 11.2 Tests and Inspections: Contractor shall retain the services of an independent, certified, testing lab to perform all testing as required by the specifications, contract drawings, and any applicable permitting agency. Contractor shall provide evidence of certification to the City before the work and testing is done. Testing results shall be submitted to the Project Manager for review and approval at the time the results are provided to the Contractor. The Contractor shall give the Project Manager and City Inspector a minimum of twenty-four (24) hours' advanced notice of readiness of the Work for all required inspections, tests, or approvals and shall notify all applicable permitting agencies in a timely manner based on requirements set forth in the permit documents.
- 11.2.1 Neither observations by the Project Manager nor inspections, tests or approvals by others shall relieve the Contractor from its obligations to perform the Work in accordance with the Contract Documents.

11.3 Uncovering Work: If any work that is to be inspected, tested or approved is covered without approval or consent of the Project Manager, it must, if requested by the Project Manager, be uncovered for observation and/or testing. Such uncovering and replacement shall be at the Contractor's sole expense unless the Contractor has given the Project Manager timely notice of the Contractor's intention to cover such Work and the Project Manager has not acted with reasonable promptness in response to such notice.

11.3.1 If the Project Manager considers it necessary or advisable that Work covered in accordance with Paragraphs 11.2.1 be observed by the City or inspected or tested by others, the Contractor at the City's request, shall uncover, expose or otherwise make available for observation, inspection or testing as the Project Manager may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, the Contractor shall bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate deductive Change Order shall be issued. If, however, such work is not found to be defective, the Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection testing and reconstruction if it makes a claim therefore as provided in Articles 14 and 15.

11.4 City May Stop the Work: If the Work is defective, or the Contractor fails to supply sufficient skilled supervisory personnel or workmen or suitable materials or equipment or the work area is deemed unsafe, the City may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the City to stop the Work shall not give rise to any duty on the part of the City to exercise this right for the benefit of the Contractor or any other Party. The City will not award any increase in Contract Price or Contract Time if the Work is stopped due to the circumstances described herein.

11.5 Correction or Removal of Defective Work Before Final Payment: If required by the Project Manager, the Contractor shall promptly, without cost to the City and as specified by the Project Manager, either correct any defective Work, whether or not fabricated, installed or completed, or if the Work has been rejected by the City remove it from the site and replace it with non-defective Work.

11.6 One Year Correction Period After Final Payment: If within one (1) year after the date of final acceptance, or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any work is found to be defective, the Contractor shall promptly, without cost to the City and in accordance with the City's written instructions, either correct such defective Work, or, if it has been rejected by the City, remove it from the site and replace it with non-defective Work.

If the Contractor does not promptly comply with the terms of such instructions or in an emergency where delay would cause serious risk of loss or damage, the City may have the defective Work corrected or the rejected Work removed and replaced, and all direct and indirect costs for such removal and replacement, including compensation for additional professional services, shall be paid by the Contractor.

11.7 Acceptance of Defective Work, Deductions: If, instead of requiring correction or removal and replacement of defective Work, the City, at the City's sole option, prefers to accept it,

the City may do so. In such a case, if acceptance occurs prior to the Project Manager's recommendation of final payments, a Change Order shall be issued incorporating the necessary revisions in the Contract's Documents, including appropriate reduction in the Contract Price; or if the acceptance occurs after such recommendation, an appropriate amount shall be paid by the Contractor to the City.

- 11.8 City May Correct Defective Work: If the Contractor fails within a reasonable time after written notice of the Project Manager to proceed to correct defective Work or to remove and replace rejected Work as required by the Project Manager in accordance with Paragraph 11.5, or if the Contractor fails to perform the Work in accordance with the Contract Documents, the City may, after seven (7) days' written notice to the Contractor, correct and remedy any such deficiency. In exercising its rights under this paragraph, the City shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, the City may exclude the Contractor from all or part of the site, take possession of all or part of the Work, suspend the Contractor's services related thereto and take possession of the Contractor's tools, construction equipment and materials stored at the site or elsewhere. The Contractor shall allow the City's representative agents and employees such access to the site as may be necessary to enable the City to exercise its rights under this paragraph. All direct and indirect costs of the City in exercising such rights shall be charged against the Contractor in an amount verified by the Project Manager, and a Change Order shall be issued incorporating the necessary revisions in the Contract Documents and a reduction in the Contract Price. Such direct and indirect costs shall include, in particular but without limitation, compensation for additional professional services required and costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of the Contractor's defective Work. The Contractor shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by the City of the City's right hereunder.

## **ARTICLE 12 – INDEMNIFICATION**

- 12.1 Disclaimer of Liability: The City shall not at any time, be liable for injury or damage occurring to any person or property from any cause, whatsoever, arising out of Contractor's construction and fulfillment of this Agreement.
- 12.2 Indemnification: For other, additional good valuable consideration, the receipt and sufficiency of which is hereby acknowledged:
- 12.2.1 Contractor shall, at its sole cost and expense, indemnify and hold harmless the City, its representatives, employees and elected and appointed officials from or on account of all claims, damages, losses, liabilities and expenses, direct, indirect or consequential including but not limited to fees and charges of engineers, architects, attorneys, consultants and other professionals and court costs arising out of or in consequence of the performance of this Agreement at all trial and appellate levels. Indemnification shall specifically include but not be limited to claims, damages, losses, liabilities and expenses arising out of or from (a) the negligent or defective design of the project and Work of this Agreement; (b) any act, omission or default of the Contractor, its subcontractors, agents, suppliers, employees or laborers; (c) any and all bodily injuries, sickness, disease or death; (d) injury to or destruction of tangible property, including any resulting loss of use; (e) other such damages, liabilities, or losses received or sustained by any person or persons during or on

account of any operations connected with the construction of this Project including the warranty period; (f) the use of any improper materials; (g) any construction defect including both patent and latent defects; (h) failure to timely complete the work; (i) the violation of any federal, state, county or City laws, ordinances or regulations by Contractor, its subcontractors, agents, servants, independent contractors or employees; (j) the breach or alleged breach by Contractor of any term of the Agreement, including the breach or alleged breach of any warranty or guarantee.

- 12.2.2 Contractor agrees to indemnify, defend, and hold harmless the City, its officers, agents and employees, from all damages, liabilities, losses, claims, fines and fees, and from any and all suits and actions of every name and description that may be brought against City, its officers, agents and employees, on account of any claims, fees, royalties, or costs for any invention or patent and/or for the infringement of any and all copyrights or patent rights claimed by any person, firm, or corporation.
- 12.2.3 Contractor shall pay all claims, losses, liens, settlements or judgments of any nature in connection with the foregoing indemnifications including, but not limited to, reasonable attorney's fees and costs for trials and appeals.
- 12.2.4 If any subcontractor, supplier, laborer, or materialmen of Contractor or any other person directly or indirectly acting for or through Contractor files or attempts to file a mechanic's or construction lien against the real property on which the work is performed or any part or against any personal property or improvements thereon or make a claim against any monies due or to become due from the City to Contractor or from Contractor to a subcontractor, for or on account of any work, labor, services, material, equipment, or other items furnished in connection with the Work or any change order, Contractor agrees to satisfy, remove, or discharge such lien or claim at its own expense by bond, payment, or otherwise within five (5) days of the filing or from receipt of written notice from the City.

Additionally, until such time as such lien or claim is satisfied, removed or discharged by Contractor, all monies due to Contractor, or that become due to Contractor before the lien or claim is satisfied, removed or otherwise discharged, shall be held by City as security for the satisfaction, removal and discharge of such lien and any expense that may be incurred while obtaining the discharge. If Contractor shall fail to do so, City shall have the right, in addition to all other rights and remedies provided by this Agreement or by law, to satisfy, remove, or discharge such lien or claim by whatever means City chooses at the entire and sole cost and expense of Contractor which costs and expenses shall, without limitation, include attorney's fees, litigation costs, fees and expenses and all court costs and assessments, and which shall be deducted from any amount owing to Contractor. In the event the amount due Contractor is less than the amount required to satisfy Contractor's obligation under this, or any other article, paragraph or section of this Agreement, the Contractor shall be liable for the deficiency due the City.

- 12.2.5 The Contractor and the City agree that Section 725.06(2), Florida Statutes (2022), as may be amended or revised, controls the extent and limits of the indemnification and hold harmless provisions of this Agreement, if any, and that the Parties waive any defects in the wording of this Article that runs afoul of said statutory section.



## ARTICLE 13 – CHANGES IN THE WORK

- 13.1 Without invalidating this Agreement, the City may, at any time or from time-to-time order additions, deletions or revisions in the Work through the issuance of Change Orders. Upon receipt of a fully executed Change Order, the Contractor shall proceed with the Work involved. All Work shall be executed under the applicable conditions of the Contract Documents. If any Change Order causes an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, an equitable adjustment will be made as provided in Article 14 or Article 15 on the basis of a claim made by either Party.
- 13.2 The Project Manager may authorize minor changes in the Work not involving an adjustment in the Contract Price or the Contract Time, which are consistent with the overall intent of the Contract Documents. Such changes must be in writing and signed by the City and the Contractor.
- 13.3 If notice of any change affecting the general scope of the Work or change in the Contract Price is required by the provisions of any Bond to be given to the Surety, it will be the Contractor's responsibility to so notify the Surety, and the amount of each applicable Bond shall be adjusted accordingly. The Contractor shall furnish proof of such adjustment to the City.

## ARTICLE 14 – CHANGE OF CONTRACT PRICE

Change of Contract Price, approved by City, shall be computed as follows:

- 14.1 Cost of the Work: The term "Cost of the Work" means the sum of all direct costs necessarily incurred and paid by Contractor in the proper performance of the Work. Except as otherwise may be agreed to in writing by the City, these costs shall be in amounts no higher than those prevailing in the City and shall include only the following items and shall not include any of the costs itemized in Paragraph 14.3:

- 14.1.1 Payroll costs for employees in the direct employ of the Contractor in the performance of the Work under schedules of job classifications agreed upon by the City and the Contractor. 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 cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, worker's compensation, health and retirement benefits, bonuses, sick leave, vacation and applicable holiday pay.

- 14.1.2 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage, and required suppliers and field services. All cash discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to the City, and the Contractor shall make provisions so that they may be obtained.

- 14.1.3 Supplemental costs including the following:

- 14.1.3.1 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.

- 14.1.3.2 Rentals of all construction equipment and machinery and the parts whether rented from the Contractor or others in accordance with rental agreements approved by the City, and the costs of transporting, loading, unloading, installation, dismantling and removal. The rental of any such equipment, machinery or parts shall cease when the use is no longer necessary for the Work.
- 14.1.3.3 Sales, consumer, use or similar taxes related to the Work and for which the Contractor is liable, imposed by laws and regulations.
- 14.1.3.4 Royalty payments and fees for permits and licenses.
- 14.1.3.5 The cost of utilities, fuel and sanitary facilities at the Work site.
- 14.1.3.6 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.
- 14.1.3.7 Cost of premiums for additional bonds and insurance required because of changes in the Work.

14.2 The Contract Price may only be increased by an approved and fully executed Change Order when Work is modified in accordance with Article 13 and approved by the City in writing. Any claim for an increase in the Contract Price resulting from a Change Order shall be based on written notice delivered to the Project Manager within ten (10) days of the occurrence of the Change Order giving rise to the claim. Notice of the amount of the claim with supporting data shall be included in the Change Order and delivered within twenty (20) days of such occurrence unless Project Manager allows an additional period of time to ascertain accurate cost data. Any change in the Contract Price resulting from any such claim shall be incorporated in the Change Order. **IT IS EXPRESSLY AND SPECIFICALLY AGREED THAT ANY AND ALL CLAIMS FOR CHANGES TO THE CONTRACT PRICE SHALL BE WAIVED IF NOT SUBMITTED IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THIS SECTION.**

14.3 Not Included in the Cost of the Work: The term "Cost of the Work" shall not include any of the following:

- 14.3.1 Payroll costs and other compensation of the Contractor's officers' executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditor, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by the Contractor whether at the site or in the 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 14.1.1, all of which are to be considered administrative costs covered by the Contractor's fee.
- 14.3.2 Expenses of the Contractor's principal and branch offices other than the Contractor's office at the site.

- 14.3.3 Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work and charges against the Contractor for delinquent payments.
- 14.3.4 Cost of premiums for all bonds and for all insurance whether or not the Contractor is required by the Contract Documents to purchase and maintain the same.
- 14.3.5 Costs due to the negligence of the 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.
- 14.3.6 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 14.1.
- 14.4 Basis of Compensation: The Contractor's compensation, allowed to the Contractor for overhead and profit, shall be determined as follows:
- 14.4.1 A mutually acceptable negotiated fee:
- 14.4.1.1 For costs incurred under Paragraphs 14.1.1 and 14.1.2, the Contractor's fee shall not exceed five percent (5%).
- 14.4.1.2 No fee shall be payable on the basis of costs itemized under Paragraphs 14.1.3.1, 14.1.3.2, 14.1.3.3, 14.1.3.4, 14.1.3.5, 14.1.3.6, 14.1.3.7, 14.3.1, 14.3.2, 14.3.3, 14.3.4, 14.3.5 and 14.3.6.
- 14.4.1.3 The amount of credit to be allowed by the Contractor to the City for any such change which results in a net decrease plus a deduction in the Contractor's fee by an amount equal to five percent (5%) for the net decrease.
- 14.4.1.4 When both additions and credits are involved in any one change the combined overhead and profit shall be figured on the basis of net increase if any, however, not to exceed five percent (5%) of the agreed compensation. Profit will not be paid on any Work not performed.
- 14.5 Cost Breakdown Required: Whenever the cost of any Work is to be determined pursuant to this Article, the Contractor will submit in form acceptable to the City an itemized cost breakdown together with supporting documentation. Whenever a change in the Work is to be based upon mutual acceptance of a lump sum, whether the amount is an addition, credit, or no-charge-in-cost, the Contractor shall submit an estimate substantiated by a complete itemized breakdown:
- 14.5.1 The breakdown shall list quantities and unit prices for materials, labor, equipment and other items of cost.
- 14.5.2 Whenever a change involves the Contractor and one (1) or more subcontractors and the change is an increase in the agreed compensation, the overhead and

profit percentage for the Contractor and each subcontractor shall be itemized separately.

## ARTICLE 15 – CHANGE OF THE CONTRACT TIME

- 15.1 The Contract Time may only be changed by an approved and fully executed Change Order. Any claim for an extension in the Contract Time shall be based on written notice delivered to the Project Manager within five (5) days of the occurrence of the event giving rise to the claim. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order.
- 15.2 The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of the Contractor if a claim is made therefore as provided in Paragraph 15.1. Such delays shall include but not be limited to, acts or neglect by the City, or to fires, floods, labor disputes, epidemics, abnormal weather conditions, pandemics, act of Governmental Authority, state of emergency, or acts of God.
- 15.3 All time limits stated in the Contract Documents are of the essence. The provisions of this Article 15 shall not exclude recovery for damages for delay by the Contractor.
- 15.4 Delays caused by or resulting from entities, contractors or subcontractors who are not affiliated with the Contractor (non-affiliated Contractors) shall not give rise to a claim by the Contractor for damages for increases in material and/or labor costs. Such entities, contractors and subcontractors include, but are not limited to, the City's contractors and subcontractors, Florida Power and Light Company, AT&T and Florida East Coast Railway, LLC.
- 15.5 Rights of Various Interests: Whenever work being done by City's forces or by other contractors is contiguous to or within the limits of work covered by this Agreement, the respective rights of the various interests involved shall be established by the Project Manager to secure the completion of the various portions of the Work in general harmony.

## ARTICLE 16 – LIQUIDATED DAMAGES

- 16.1 Upon failure of the Contractor to complete the Work within the time specified for completion, the Contractor shall pay to the City the sum of **Two Hundred Fifty (\$250.00)** for each and every calendar day that the completion of the Work is delayed beyond the time specified in this Agreement for completion, as fixed and agreed liquidated damages and not as a penalty, so long as the delay is caused by the Contractor. Should an act of God or the acts or omissions of the City, its agents or representatives, in derogation to the terms of this Agreement cause the delay, the Contractor shall not be responsible for the delay nor liquidated damages. Liquidated damages are fixed and agreed upon between the Parties, recognizing the impossibility of precisely ascertaining the amount of damages that will be sustained by the City as a consequence of such delay and both Parties desiring to obviate any question of dispute concerning the amount of damages and the cost and effect of the failure of the Contractor to complete the Work on time. Liquidated damages shall apply separately to each portion of the Work for which a time of completion is given. The City shall have the right to deduct from or retain any compensation which may be due or which may become due and payable to the Contractor the amount of liquidated damages, and if the amount retained by the City is insufficient to pay in full such liquidated damages, the Contractor shall pay all liquidated damages in full. The Contractor shall be

responsible for reimbursing the City, in addition to liquidated damages or other damages for delay, for all costs of engineering, architectural fees, and inspection and other costs incurred in administering the construction of the Project beyond the completion date specified or beyond an approved extension of time granted to the Contractor whichever is later. Delays caused by or resulting from entities, contractors or subcontractors who are not affiliated with the Contractor shall not give rise to a claim by Contractor for damages for increase in material and/or labor costs. Such entities, contractors and subcontractors include, but are not limited to, the City's contractors and subcontractors, Florida Power and Light Company, AT&T, and Florida East Coast Railway, LLC.

- 16.2 No Extended Damages: For other and additional good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the Contractor covenants and agrees that in the event of any delay of construction or for any reason, allegation or claim, and notwithstanding the reason of the delay, reason, claim or allegation or who caused them or the construction delay or whether they were caused by the City, that there will be no entitlement to Contractor to or for any direct or indirect financial damages or losses for extended corporate overhead impact, extended project overhead impacts, project support services, mobilization or demobilization or by whatever other label or legal concept or theory and types of names or labels or basis such claims may have, or any business damages or losses of whatever type or nature, and Contractor hereby waives any right to make any such claim or claims. This provision will have application and effect when construction delays are anticipated and agreed upon by both the City and the Contractor.

## **ARTICLE 17 – SUSPENSION OF WORK AND TERMINATION**

- 17.1 City May Suspend Work: The City may, at any time and without cause, suspend the Work or any portion of the Work for a period of not more than ninety (90) days by notice in writing to the Contractor which shall fix the date on which Work shall be resumed. The Contractor shall resume the Work on the date fixed. The Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension, if the Contractor makes a claim as provided in Articles 14 and 15.
- 17.2 City's Right to Terminate Contract: The City may terminate this Agreement upon fifteen (15) calendar days' written notice upon the occurrence of any one or more of the following events:
- 17.2.1 If the Contractor makes a general assignment for the benefit of creditors.
  - 17.2.2 If a trustee, receiver, custodian or agent of the Contractor is appointed under applicable law or under Agreement, whose appointment or authority to take charge of property of the Contractor is for the purpose of enforcing a lien against such property or for the purpose of general administration of such property for the benefit of the Contractor's creditors.
  - 17.2.3 If Contractor fails to begin the Work within fifteen (15) calendar days after the date set forth in the Notice to Proceed, or fails to perform the Work with sufficient workers and equipment or with sufficient materials to ensure the prompt completion of the Work, or shall perform the Work unsuitably, or cause it to be rejected as defective and unsuitable, or shall discontinue the prosecution of the Work pursuant to the accepted schedule or if Contractor shall fail to perform any material term set forth in the Contract Documents, or from any other cause

whatsoever shall not carry on the Work in an acceptable manner, Project Manager may give notice in writing to Contractor and its Surety of such delay, neglect or default, specifying the same.

17.2.4 If the Contractor repeatedly fails to make prompt payments to subcontractors or for labor, material or equipment.

17.2.5 If the Contractor repeatedly disregards proper safety procedures.

17.2.6 If the Contractor disregards any local, state or federal laws or regulations.

17.2.7 If the Contractor otherwise violates any provisions of this Agreement.

17.3 If Contractor, within a period of ten (10) calendar days after such notice, shall not proceed in accordance therewith, the City may exclude the Contractor from the Work site and take the prosecution of the Work out of the hands of the Contractor, and take possession of the Work and all of the Contractor's tools, appliances, construction equipment and machinery at the site and use them without liability to the City for trespass or conversion, incorporate in the Work all materials and equipment stored at the site or for which the City has paid the Contractor but which are stored elsewhere, and finish the Work as the City may deem expedient. In this instance, the Contractor shall not be entitled to receive any further compensation until the Work is finished.

17.3.1 If after notice of termination of Contractor's notice to proceed, it is determined for any reason that Contractor was not in default, the rights and obligations of City and Contractor shall be the same as if the notice of termination had been issued pursuant to the Termination for Convenience clause as set forth below in Section 17.5.

17.3.2 Upon receipt of Notice of Termination pursuant to Sections 17.2 or 17.5, Contractor shall promptly discontinue all affected work unless the Notice of Termination directs otherwise and deliver or otherwise make available to City all data, drawings, specifications, reports, estimates, summaries and such other information as may have been required by the Contract Documents whether completed or in process.

17.4 If the Contractor commits a default due to its insolvency or bankruptcy, the following shall apply:

17.4.1 Should this Agreement be entered into and fully executed by the Parties, funds released and the Contractor (Debtor) files for bankruptcy, the following shall occur:

17.4.1.1 In the event the Contractor files a voluntary petition under 11 U.S.C. 301 or 302, or an order for relief is entered under 11 U.S.C. 303, the Contractor shall acknowledge the extent, validity, and priority of the lien recorded in favor of the City. The Contractor further agrees that in the event of this default, the City shall, at its option, be entitled to seek relief from the automatic stay pursuant to 11 U.S.C. 362. The City shall be entitled to relief from the automatic stay pursuant to 11 U.S.C. 362(d) (1) or (d) (2), and the Contractor agrees to waive the notice provisions in effect pursuant to 11 U.S.C. 362 and any applicable Local Rules of the United States Bankruptcy Court. The Contractor acknowledges that such waiver is done knowingly and voluntarily.

17.4.1.2 Alternatively, in the event the City does not seek stay relief, or if stay relief is denied, the City shall be entitled to monthly adequate protection payments within the meaning of 11 U.S.C. 361. The monthly adequate protection payments shall each be in an amount determined in accordance with the Note and Mortgage executed by the Contractor in favor of the City.

17.4.1.3 In the event the Contractor files for bankruptcy under Chapter 13 of Title 11, United States Code in addition to the foregoing provisions, the Contractor agrees to cure any amounts in arrears over a period not to exceed twenty-four (24) months from the date of the confirmation order, and such payments shall be made in addition to the regular monthly payments required by the Note and mortgage. Additionally, the Contractor shall agree that the City is over secured and, therefore, entitled to interest and attorney's fees pursuant to 11 U.S.C. 506(b). Such fees shall be allowed and payable as an administrative expense. Further, in the event the Contractor has less than five (5) years of payments remaining on the Note, the Contractor agrees that the treatment afforded to the claim of the City under any confirmed plan of reorganization shall provide that the remaining payments shall be satisfied in accordance with the Note, and that the remaining payments or claim shall not be extended or amortized over a longer period than the time remaining under the Note.

17.4.2 Should this Agreement be entered into and fully executed by the Parties, and the funds have not been forwarded to Contractor, the following shall occur:

17.4.2.1 In the event the Contractor files a voluntary petition pursuant to 11 U.S.C. 301 or 302, or an order for relief is entered under 11 U.S.C. 303., the Contractor acknowledges that the commencement of a bankruptcy proceeding constitutes an event of default under the terms of this Agreement. Further, the Contractor acknowledges that this Agreement constitutes an executory contract within the meaning of 11 U.S.C. 365. The Contractor acknowledges that this Agreement is not capable of being assumed pursuant to 11 U.S.C. 365(c)(2), unless the City expressly consents in writing to the assumption. In the event the City consents to the assumption, the Contractor agrees to file a motion to assume this Agreement within ten (10) days after receipt of written consent from the City, regardless of whether the bankruptcy proceeding is pending under Chapter 7, 11, or 13 of Title 11 of the United States Code. The Contractor further acknowledges that this Agreement is not capable of being assigned pursuant to 11 U.S.C. 365(b)(1).

17.5 Termination for Convenience: This Agreement may be terminated for convenience in writing by City upon thirty (30) days' written notice to Contractor (delivered by certified mail, return receipt requested) of intent to terminate and the date on which such termination becomes effective. In such case, Contractor shall be paid for all work executed and accepted by the City and costs reasonably incurred by Contractor relating to commitments which had become firm prior to the termination. No payment shall be made for profit for work/services which have not been performed or accepted.

- 17.6 Where the Contractor's service has been so terminated by the City, the termination shall not affect any rights of the City against the Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due the Contractor by the City will not release the Contractor from liability.
- 17.7 The Contractor has no right, authority or ability to terminate the Work except for the wrongful withholding of any payments due the Contractor from the City.

## **ARTICLE 18 – DISPUTE RESOLUTION**

- 18.1 Resolution of Disputes: Questions, claims, difficulties and disputes of whatever nature which may arise relative to the technical interpretation of the Contract Documents and fulfillment of this Agreement as to the character, quality, amount and value of any work done and materials furnished, or proposed to be done or furnished under, or by reason of, the Contract Documents which cannot be resolved by mutual agreement of City Project Manager and Contractor shall be submitted to the City Manager or his designee and Contractor's representative for resolution. Prior to any litigation being commenced, for any disputes which remain unresolved, within sixty (60) days after final completion of the Work, the Parties shall participate in mediation to address all unresolved disputes to a mediator agreed upon by the Parties. Should any objection not be resolved in mediation, the Parties retain all their legal rights and remedies provided under the laws of Florida. Failure by a Party to comply in strict accordance with the requirements of this Article, then said Party specifically waives all of its rights provided hereunder, including its rights and remedies under the laws of Florida.
- 18.1.1 All non-technical administrative disputes (such as billing and payment) shall be determined by Contract Administrator.
- 18.1.2 During the pendency of any dispute and after a determination thereof, Contractor and Contract Administrator shall act in good faith to mitigate any potential damages including utilization of construction schedule changes and alternate means of construction. During the pendency of any dispute arising under this Agreement, other than termination herein, Contractor shall carry on the Work and adhere to the progress schedule. The Work shall not be delayed or postponed pending resolution of any disputes or disagreements.
- 18.1.3 For any disputes which remain unsolved, within sixty (60) calendar days after Final Completion of the Work, the Parties shall participate in mediation to address all unresolved disputes. A mediator shall be mutually agreed upon by the Parties. Should any objection not be resolved in mediation, the Parties retain all their legal rights and remedies under applicable law. If a Party objecting to a determination, fails to comply in strict accordance with the requirements of this Article, said Party specifically waives all of its rights provided hereunder, including its rights and remedies under applicable law.

## **ARTICLE 19 – NOTICES**

- 19.1 All notices required by any of the Contract Documents shall be in writing and shall be deemed delivered upon mailing by certified mail, return receipt requested to the following:



To the City:

Khant Myat, P.E.  
Project Manager  
6000 NW 21<sup>st</sup> Avenue  
Fort Lauderdale, FL 33309  
Telephone: 954-828-5061  
E-mail: [kmyat@fortlauderdale.gov](mailto:kmyat@fortlauderdale.gov)

with copies to:

City Manager  
City of Fort Lauderdale  
401 SE 21<sup>st</sup> Street  
Fort Lauderdale, FL 33316

and

City Attorney  
City of Fort Lauderdale  
1 East Broward Blvd, Suite 1605  
Fort Lauderdale, FL 33301-1016

To the Contractor:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Telephone: \_\_\_\_\_  
E-mail: \_\_\_\_\_

## ARTICLE 20 – LIMITATION OF LIABILITY

20.1 The City desires to enter into this Agreement only if in so doing the City can place a limit on the City's liability for any cause of action arising out of this Agreement, so that the City's liability for any breach never exceeds the sum of \$1,000. For other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Contractor expresses its willingness to enter into this Agreement with the knowledge that the Contractor's recovery from the City to any action or claim arising from the Agreement is limited to a maximum amount of \$1,000, which amount shall be reduced by the amount actually paid by the City to the Contractor pursuant to this Agreement, for any action or claim arising out of this Agreement. Nothing contained in this paragraph or elsewhere in this Agreement is in any way intended either to be a waiver of the limitation placed upon the City's liability as set forth in Section 768.28, Florida Statutes (2022), as may be amended or revised, or to extend the City's liability beyond the limits established in said Section 768.28, Florida Statutes (2022), as may be amended or revised; and no claim or award against the City shall include attorney's fees, investigative costs, expert fees, suit costs or pre-judgment interest.

20.2 No Extended Damages: For other and additional good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the Contractor covenants and agrees that in the event of any delay of construction or for any reason, allegation or claim, and notwithstanding the reason of the delay, reason, claim or allegation or who caused them or the construction delay or whether they were caused by the City, that there will be no entitlement to Contractor to or for any direct or indirect financial damages or losses for extended corporate overhead impact, extended project overhead impacts, project support services, mobilization or demobilization or by whatever other label or legal concept or theory and types of names or labels or basis such claims may have, or any business damages or losses of whatever type or nature, and Contractor hereby waives any right to

make any such claim or claims. This provision will have application and effect when construction delays are anticipated and agreed upon by both the City and the Contractor.

## **ARTICLE 21 – GOVERNING LAW; WAIVER OF JURY TRIAL**

- 21.1 The Agreement shall be interpreted and construed in accordance with, and governed by, the laws of the state of Florida. The Parties agree that the exclusive venue for any lawsuit arising from, related to, or in connection with this Agreement shall be in the state courts of the Seventeenth Judicial Circuit in and for Broward County, Florida. If any claims arising from, related to, or in connection with this Agreement must be litigated in federal court, the Parties agree that the exclusive venue for any such lawsuit shall be in the United States District Court or United States Bankruptcy Court for the Southern District of Florida. **BY ENTERING INTO THIS AGREEMENT, THE PARTIES HEREBY EXPRESSLY WAIVE ANY AND ALL RIGHTS EITHER PARTY MIGHT HAVE TO A TRIAL BY JURY OF ANY ISSUES RELATED TO THIS AGREEMENT. IF A PARTY FAILS TO WITHDRAW A REQUEST FOR A JURY TRIAL IN A LAWSUIT ARISING OUT OF THIS AGREEMENT AFTER WRITTEN NOTICE BY THE OTHER PARTY OF VIOLATION OF THIS SECTION, THE PARTY MAKING THE REQUEST FOR JURY TRIAL SHALL BE LIABLE FOR THE REASONABLE ATTORNEYS' FEES AND COSTS OF THE OTHER PARTY IN CONTESTING THE REQUEST FOR JURY TRIAL, AND SUCH AMOUNTS SHALL BE AWARDED BY THE COURT IN ADJUDICATING THE MOTION.**

## **ARTICLE 22 – MISCELLANEOUS**

- 22.1 The duties and obligations imposed by this Agreement and the rights and remedies available to the Parties and, in particular but without limitation, the warranties, guaranties and obligations imposed upon the Contractor and all of the rights and remedies available to the City, 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 Documents, and the provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents, and the provisions of this Paragraph will survive final payment and termination or completion of this Agreement.
- 22.2 The Contractor shall not assign or transfer this Agreement or its rights, title or interests. The obligations undertaken by the Contractor pursuant to this Agreement shall not be delegated or assigned to any other person or firm. Violation of the terms of this Paragraph shall constitute a material breach of Agreement by the Contractor and the City any, at its discretion, cancel this Agreement and all rights, title and interest of the Contractor which shall immediately cease and terminate.
- 22.3 The Contractor and its employees, volunteers and agents shall be and remain as independent contractor and not agents or employees of the City with respect to all of the acts and services performed by and under the terms of this Agreement. This Agreement shall not in any way be constructed to create a partnership, association or any other kind of joint undertaking or venture between the Parties.
- 22.4 The City reserves the right to audit the records of the Contractor relating in any way to the Work to be performed pursuant to this Agreement at any time during the performance and term of this Agreement and for a period of three (3) years after completion and acceptance by the City. If required by the City, the Contractor agrees to submit to an audit by an

independent certified public accountant selected by the City. The Contractor shall allow the City to inspect, examine and review the records of the Contractor at any and all times during normal business hours during the term of this Agreement.

- 22.5 The remedies expressly provided in this Agreement to the City shall not be deemed to be exclusive but shall be cumulative and in addition to all other remedies in favor of the City now or later existing at law or in equity.
- 22.6 Should any part, term or provisions of this Agreement be decided by the courts to be invalid, illegal or in conflict with any state or federal law, the validity of the remaining portion or provision shall not be affected.
- 22.7 Prohibition Against Contracting With Scrutinized Companies: Subject to *Odebrecht Construction, Inc., v. Prasad*, 876 F.Supp.2d 1305 (S.D. Fla. 2012), *affirmed*, *Odebrecht Construction, Inc., v. Secretary, Florida Department of Transportation*, 715 F.3d 1268 (11th Cir. 2013), with regard to the "Cuba Amendment," the Contractor certifies that it is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in Iran Terrorism Sectors List, created pursuant to Section 215.473, Florida Statutes (2024), as may be amended or revised, and that it does not have business operations in Cuba or Syria, as provided in Section 287.135, Florida Statutes (2024), as may be amended or revised. The Contractor certifies that it is not on the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2024), as may be amended or revised, and that it is not engaged in a boycott of Israel. The City may terminate this Agreement at the City's option if the Contractor is found to have submitted a false certification as provided under subsection (5) of Section 287.135, Florida Statutes (2024), as may be amended or revised, or been placed on the Scrutinized Companies with Activities in Sudan List, or been placed on a list created pursuant to Section 215.473, Florida Statutes (2024), as may be amended or revised, relating to scrutinized active business operations in Iran, or been placed on the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2024), as may be amended or revised, or is engaged in a boycott of Israel, or has been engaged in business operations in Cuba or Syria, as defined in Section 287.135, Florida Statutes (2024), as may be amended or revised.

By submitting a bid or response, the company, principals, or owners certify that it is not listed on the Scrutinized Companies with Activities in Sudan List or listed on the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List or is engaged in business operations in Cuba or Syria.

- 22.8 Public Entity Crimes: In accordance with the Public Crimes Act, Section 287.133, Florida Statutes (2022), as may be amended or revised, a person or affiliate who is a contractor, consultant or other provider, who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to the City, may not submit a bid on a contract with the City for the construction or repair of a public building or public work, may not submit bids on leases of real property to the City, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with the City, and may not transact any business with the City in excess of the threshold amount provided in Section 287.017, Florida Statutes (2022), as may be amended or revised, for category two purchases for a period of thirty-six (36) months from the date of being placed on the convicted vendor list. Violation of this section by Contractor shall result in cancellation of the City purchase and may result in Contractor debarment.

22.9 Attorney Fees: If City or Contractor incurs any expense in enforcing the terms of this Agreement through litigation, the prevailing Party in that litigation shall be reimbursed for all such costs and expenses, including but not limited to court costs, and reasonable attorney fees incurred during litigation.

22.10 Not applicable.

22.11 Public Records:

**IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES (2022), TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT [PRRCONTRACT@FORTLAUDERDALE.GOV](mailto:PRRCONTRACT@FORTLAUDERDALE.GOV), 954-828-5002, CITY CLERK'S OFFICE, 1 East Broward Boulevard, Suite 444, Fort Lauderdale, FL 33301.**

Contractor shall:

1. Keep and maintain public records required by the City in order to perform the service.
2. Upon request from the City's custodian of public records, provide the City with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes (2022), as may be amended or revised, or as otherwise provided by law.
3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of this Agreement if the Contractor does not transfer the records to the City.
4. Upon completion of the Agreement, transfer, at no cost, to the City all public records in possession of the Contractor or keep and maintain public records required by the City to perform the service. If the Contractor transfers all public records to the City upon completion of this Agreement, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of this Agreement, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City.

22.12 Non-Discrimination:

The Contractor shall not discriminate against its employees based on the employee's race, color, religion, gender, gender identity, gender expression, marital status, sexual orientation, national origin, age, disability, or any other protected classification as defined by applicable law.

1. The Contractor certifies and represents that the Contractor offers the same health benefits to the domestic partners of its employees as are offered its employees' spouses or offers its employees the cash equivalent of such health benefits because it is unable to provide health benefits to its employees' domestic partners, and that the Contractor will comply with Section 2-187, Code of Ordinances of the City of Fort Lauderdale, Florida, as may be amended or revised, ("Section 2-187"), during the entire term of this Agreement.
2. The failure of the Contractor to comply with Section 2-187 shall be deemed to be a material breach of this Agreement, entitling the City to pursue any remedy stated below or any remedy provided under applicable law.
3. The City may terminate this Agreement if the Contractor fails to comply with Section 2-187.
4. The City may retain all monies due or to become due until the Contractor complies with Section 2-187.
5. The Contractor may be subject to debarment or suspension proceedings. Such proceedings will be consistent with the procedures in Section 2-183 of the Code of Ordinances of the City of Fort Lauderdale, Florida.

22.13 E-Verify:

As a condition precedent to the effectiveness of this Agreement, pursuant to Section 448.095, Florida Statutes (2023), as may be amended or revised, the Contractor and its subcontractors shall register with and use the E-Verify system to electronically verify the employment eligibility of newly hired employees.

1. The Contractor shall require each of its subcontractors, if any, to provide the Contractor with an affidavit stating that the subcontractor does not employ, contract with, or subcontract with an unauthorized alien. The Contractor shall maintain a copy of the subcontractor's affidavit for the duration of this Agreement and in accordance with the public records requirements of this Agreement.

2. The City, the Contractor, or any subcontractor who has a good faith belief that a person or entity with which it is contracting has knowingly violated Subsection 448.09(1), Florida Statutes (2023), as may be amended or revised, shall terminate the contract with the person or entity.

3. The City, upon good faith belief that a subcontractor knowingly violated the provisions of Subsection 448.095(5), Florida Statutes (2023), as may be amended or revised, but that the Contractor otherwise complied with Subsection 448.095(5), Florida Statutes (2023), as may be amended or revised, shall promptly notify Contractor and order the Contractor to immediately terminate the contract with the subcontractor, and the Contractor shall comply with such order.

4. A contract terminated under Subparagraph 448.095(5)(c)1. or 2., Florida Statutes (2023), as may be amended or revised, is not a breach of contract and may not be considered as such. If the City terminates this contract under Paragraph 448.095(5)(c), Florida Statutes (2023), as may be amended or revised, the Contractor may not be

awarded a public contract for at least one year after the date on which the contract was terminated. The Contractor is liable for any additional costs incurred by the City as a result of termination of this Agreement.

5. Contractor shall include in each of its subcontracts, if any, the requirements set forth in this Section, including this subparagraph, requiring any and all subcontractors, as defined in Subsection 448.095(1)(e), Florida Statutes (2023), as may be amended or revised, to include all of the requirements of this Section in their subcontracts. Contractor shall be responsible for compliance by any and all subcontractors, as defined in Subsection 448.095(1)(e), Florida Statutes (2023), as may be amended or revised, with the requirements of Section 448.095, Florida Statutes (2023), as may be amended or revised.

22.14 Anti-Human Trafficking:

As a condition precedent to the effectiveness of this Agreement, the Contractor shall provide the City with an affidavit signed by an officer or a representative of the Contractor under penalty of perjury attesting that the Contractor does not use coercion for labor or services defined in Section 787.06, Florida Statutes (2023), as may be amended or revised.

**[INTENTIONALLY LEFT BLANK]**

**CITY**

IN WITNESS OF THE FOREGOING, the Parties have set their hands and seals the day and year first written above.

CITY OF FORT LAUDERDALE, a Florida municipal  
corporation

By: \_\_\_\_\_  
SUSAN GRANT  
City Manager

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

ATTEST:

By: \_\_\_\_\_  
DAVID R. SOLOMAN  
City Clerk

Approved as to Legal Form and correctness:  
Thomas J. Ansbro, City Attorney

By: \_\_\_\_\_  
SHARI C. WALLEN  
Assistant City Attorney

**CONTRACTOR**

WITNESSES:

CONTRACTOR.,  
a Florida company/corporation.

\_\_\_\_\_

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

\_\_\_\_\_

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

Print Name

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

ATTEST:

\_\_\_\_\_

\_\_\_\_\_

Print Name

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

Secretary

(CORPORATE SEAL)

STATE OF \_\_\_\_\_:

COUNTY OF \_\_\_\_\_:

The foregoing instrument was acknowledged before me by means of ☐ physical presence or ☐ online notarization, this \_\_\_\_ day of \_\_\_\_\_, 2024, by \_\_\_\_\_, (NAME OF AUTHORIZED OFFICER) as \_\_\_\_\_ (TITLE OF AUTHORIZED OFFICER), for \_\_\_\_\_ (NAME OF COMPANY), a Florida \_\_\_\_\_ (TYPE OF COMPANY).

\_\_\_\_\_  
(Signature of Notary Public - State of Florida)

\_\_\_\_\_  
(Print, Type, or Stamp Commissioned Name of Notary Public)

Personally Known \_\_\_\_\_ OR Produced Identification \_\_\_\_\_  
Type of Identification Produced: \_\_\_\_\_



**AFFIDAVIT OF COMPLIANCE WITH FOREIGN ENTITY LAWS**  
**(Florida Statute- §287.138, 692.201, 692.202, 692.203, and 692.204)**

The undersigned, on behalf of the entity listed below ("Entity"), hereby attests under penalty of perjury as follows:

1. Entity is not owned by the government of a foreign country of concern as defined in Section 287.138, Florida Statutes. (Source:§ 287.138(2)(a), Florida Statutes)
2. The government of a foreign country of concern does not have a controlling interest in Entity. (Source:§ 287.138(2)(b), Florida Statutes)
3. Entity is not organized under the laws of, and does not have a principal place of business in, a foreign country of concern. (Source: § 287.138(2)(c), Florida Statutes)
4. Entity is not owned or controlled by the government of a foreign country of concern, as defined in Section 692.201, Florida Statutes. (Source:§ 288.007(2), Florida Statutes)
5. Entity is not a partnership, association, corporation, organization, or other combination of persons organized under the laws of or having its principal place of business in a foreign country of concern, as defined in Section 692.201, Florida Statutes, or a subsidiary of such entity. (Source: § 288.007(2), Florida Statutes)
6. Entity is not a foreign principal, as defined in Section 692.201, Florida Statutes. (Source: § 692.202(5)(a)(I), Florida Statutes)
7. Entity is in compliance with all applicable requirements of Sections 692.202, 692.203, and 692.204, Florida Statutes.
8. **(Only applicable if purchasing real property)** Entity is not a foreign principal prohibited from purchasing the subject real property. Entity is either (a) not a person or entity described in Section 692.204(1)(a), Florida Statutes, or (b) authorized under Section 692.204(2), Florida Statutes, to purchase the subject property. Entity is in compliance with the requirements of Section 692.204, Florida Statutes. (Source:§§ 692.203(6)(a), 692.204(6)(a), Florida Statutes)

The undersigned is authorized to execute this affidavit on behalf of Entity.

Name: \_\_\_\_\_ Title: \_\_\_\_\_ Entity: \_\_\_\_\_

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

**NOTARY PUBLIC ACKNOWLEDGEMENT SECTION**

STATE OF \_\_\_\_\_

COUTY OF \_\_\_\_\_

The foregoing instrument was acknowledged before me, by means of ☐ physical presence or ☐ online notarization, this \_\_\_\_ day of \_\_\_\_\_ 20 \_\_, by \_\_\_\_\_, as \_\_\_\_\_ for \_\_\_\_\_, who is personally known to me or who has produced \_\_\_\_\_ as identification.

Notary Public Signature: \_\_\_\_\_

(Notary Seal)

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

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

## CITY OF FORT LAUDERDALE BID/PROPOSAL CERTIFICATION

**Please Note:** It is the sole responsibility of the bidder/proposer to ensure that their response is submitted electronically through the [City's on-line strategic sourcing platform](#) prior to the bid opening date and time listed. Paper bid submittals will not be accepted. All fields below must be completed. If the field does not apply to you, please note N/A in that field.

If you are a foreign corporation, you may be required to obtain a certificate of authority from the department of state, in accordance with Florida Statute §607.1501 (visit <http://www.dos.state.fl.us/>).

Company: (Legal Registration) \_\_\_\_\_ EIN (Optional): \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone No.: \_\_\_\_\_ FAX No.: \_\_\_\_\_ Email: \_\_\_\_\_

Delivery: Calendar days after receipt of Purchase Order (**section 1.02 of General Conditions**): \_\_\_\_\_

Total Bid Discount (**section 1.05 of General Conditions**): \_\_\_\_\_

Check box if your firm qualifies for DBE (**section 1.09 of General Conditions**): ☐

**ADDENDUM ACKNOWLEDGEMENT** - Proposer acknowledges that the following addenda have been received and are included in the proposal:

Addendum No.	Date Issued	Addendum No.	Date Issued	Addendum No.	Date Issued	Addendum No.	Date Issued
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

**VARIANCES:** If you take exception or have variances to any term, condition, specification, scope of service, or requirement in this competitive solicitation you must specify such exception or variance in the space provided below or reference in the space provided below all variances contained on other pages within your response. Additional pages may be attached if necessary. No exceptions or variances will be deemed to be part of the response submitted unless such is listed and contained in the space provided below. The City does not, by virtue of submitting a variance, necessarily accept any variances. If no statement is contained in the below space, it is hereby implied that your response is in full compliance with this competitive solicitation. If you do not have variances, simply mark N/A.

The below signatory hereby agrees to furnish the following article(s) or services at the price(s) and terms stated subject to all instructions, conditions, specifications addenda, legal advertisement, and conditions contained in the bid/proposal. I have read all attachments including the specifications and fully understand what is required. By submitting this signed proposal, I will accept a contract if approved by the City and such acceptance covers all terms, conditions, and specifications of this bid/proposal. The below signatory also hereby agrees, by virtue of submitting or attempting to submit a response, that in no event shall the City's liability for respondent's direct, indirect, incidental, consequential, special or exemplary damages, expenses, or lost profits arising out of this competitive solicitation process, including but not limited to public advertisement, bid conferences, site visits, evaluations, oral presentations, or award proceedings exceed the amount of Five Hundred Dollars (\$500.00). This limitation shall not apply to claims arising under any provision of indemnification or the City's protest ordinance contained in this competitive solicitation.

Submitted by:

\_\_\_\_\_  
Name (printed)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title



### **CONTRACT PAYMENT METHOD**

The City of Fort Lauderdale has implemented a Procurement Card (P-Card) program which changes how payments are remitted to its vendors. The City has transitioned from traditional paper checks to credit card payments via MasterCard or Visa as part of this program.

This allows you as a vendor of the City of Fort Lauderdale to receive your payments fast and safely. No more waiting for checks to be printed and mailed.

In accordance with the contract, payments on this contract will be made utilizing the City's P-Card (MasterCard or Visa). Accordingly, bidders must presently have the ability to accept the credit card or take whatever steps necessary to implement acceptance of a card before the start of the contract term, or contract award by the City.

All costs associated with the Contractor's participation in this purchasing program shall be borne by the Contractor. The City reserves the right to revise this program as necessary.

By signing below, you agree with these terms.

Please indicate which credit card payment you prefer:

\_\_\_\_\_ MasterCard

\_\_\_\_\_ Visa

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Name (Printed)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date



**CONTRACTOR'S CERTIFICATE OF COMPLIANCE WITH  
NON-DISCRIMINATION PROVISIONS OF THE CONTRACT**

The completed and signed form should be returned with the Contractor's submittal. If not provided with submittal, the Contractor must submit within three business days of City's request. Contractor may be deemed non-responsive for failure to fully comply within stated timeframes.

Pursuant to City Ordinance Sec. 2-17(a)(i)(ii), bidders must certify compliance with the Non-Discrimination provision of the ordinance.

- A. Contractors doing business with the City shall not discriminate against their employees based on the employee's race, color, religion, gender (including identity or expression), marital status, sexual orientation, national origin, age, disability, or any other protected classification as defined by applicable law.

Contracts. Every Contract exceeding \$100,000, or otherwise exempt from this section shall contain language that obligates the Contractor to comply with the applicable provisions of this section.

The Contract shall include provisions for the following:

- (i) The Contractor certifies and represents that it will comply with this section during the entire term of the contract.
- (ii) The failure of the Contractor to comply with this section shall be deemed to be a material breach of the contract, entitling the City to pursue any remedy stated below or any remedy provided under applicable law.

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

\_\_\_\_\_  
Print Name and Title

\_\_\_\_\_  
Date



### **E-VERIFY AFFIRMATION STATEMENT**

Solicitation/Bid /Contract No: \_\_\_\_\_

Project Description:

Contractor/Proposer/Bidder acknowledges and agrees to utilize the U.S. Department of Homeland Security's E-Verify System to verify the employment eligibility of,

- A. all persons employed by Contractor/Proposer/Bidder to perform employment duties within Florida during the term of the Contract, and,
- B. all persons (including subcontractors/vendors) assigned by Contractor/Proposer/Bidder to perform work pursuant to the Contract.

The Contractor/Proposer/Bidder acknowledges and agrees that use of the U.S. Department of Homeland Security's E-Verify System during the term of the Contract is a condition of the Contract.

Contractor/Proposer/ Bidder Company Name: \_\_\_\_\_

Authorized Company Person's Signature: \_\_\_\_\_

Authorized Company Person's Title: \_\_\_\_\_

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



### **NON-COLLUSION STATEMENT**

By signing this offer, the vendor/contractor certifies that this offer is made independently and *free* from collusion. Vendor shall disclose below any City of Fort Lauderdale, FL officer or employee, or any relative of any such officer or employee who is an officer or director of, or has a material interest in, the vendor's business, who is in a position to influence this procurement.

Any City of Fort Lauderdale, FL officer or employee who has any input into the writing of specifications or requirements, solicitation of offers, decision to award, evaluation of offers, or any other activity pertinent to this procurement is presumed, for purposes hereof, to be in a position to influence this procurement.

For purposes hereof, a person has a material interest if they directly or indirectly own more than 5 percent of the total assets or capital stock of any business entity, or if they otherwise stand to personally gain if the contract is awarded to this vendor.

In accordance with City of Fort Lauderdale, FL Policy and Standards Manual, 6.10.8.3,

3.3. City employees may not contract with the City through any corporation or business entity in which they or their immediate family members hold a controlling financial interest (e.g., ownership of five (5) percent or more).

3.4. Immediate family members (spouse, parents, and children) are also prohibited from contracting with the City subject to the same general rules.

**Failure of a vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the City Procurement Code.**

#### **NAME**

#### **RELATIONSHIPS**

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

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

**In the event the vendor does not indicate any names, the City shall interpret this to mean that the vendor has indicated that no such relationships exist.**

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Name (Printed)

\_\_\_\_\_  
Date

## **SPECIFIC REFERENCES FORM**

The contractor shall have previous construction experience in the State of Florida with projects of similar scope and scale (or larger) as specified in Section 8, Special Conditions. Complete this form in its entirety. **Note: Do not include proposed team members or parent/subsidiary companies as references in your submittal.**

**PRIME BIDDER'S NAME:** \_\_\_\_\_

CLIENT NO. 1 – Name of firm to be contacted: \_\_\_\_\_

Address: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Phone No: \_\_\_\_\_

Contact E-Mail Address: \_\_\_\_\_

Project Performance Period: \_\_\_\_\_ to \_\_\_\_\_  
Dates should be in mm/yy format

Project Name: \_\_\_\_\_

Location of Project: \_\_\_\_\_

Description of the overall scope: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Description of work that was self-performed by Bidder: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## **SPECIFIC REFERENCES FORM**

CLIENT NO. 2 – Name of firm to be contacted: \_\_\_\_\_

Address: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Phone No: \_\_\_\_\_

Contact E-Mail Address: \_\_\_\_\_

Project Performance Period: \_\_\_\_\_ to \_\_\_\_\_  
Dates should be in mm/yy format

Project Name: \_\_\_\_\_

Location of Project: \_\_\_\_\_

Description of the overall scope: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Description of work that was self-performed by Bidder: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## **SPECIFIC REFERENCES FORM**

CLIENT NO. 3 – Name of firm to be contacted: \_\_\_\_\_

Address: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Phone No: \_\_\_\_\_

Contact E-Mail Address: \_\_\_\_\_

Project Performance Period: \_\_\_\_\_ to \_\_\_\_\_  
Dates should be in mm/yy format

Project Name: \_\_\_\_\_

Location of Project: \_\_\_\_\_

Description of the overall scope: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Description of work that was self-performed by Bidder: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**TRENCH SAFETY**

Bidder acknowledges that included in the appropriate bid items of his bid and in the Total Bid Price are costs for complying with the Florida Trench Safety Act, Florida Statutes 553.60 – 553.64. The bidder further identifies the costs of such compliance to be summarized below:

<b>Trench Safety Measure (Description)</b>	<b>Units of Measure (LF/SF)</b>	<b>Unit (Quantity)</b>	<b>Unit Cost</b>	<b>Extended Cost</b>
A.				
B.				
C.				
D.				
<b>Total:</b>				

The bidder certifies that all trench excavation done within his control in excess of five feet (5') in depth shall be in accordance with the Occupational Safety and Health Administration's excavation safety standards, C.F.R. s. 1926.650 Subpart P., and the Florida Trench Safety Act, Florida Statutes 553.60-553.64.

Failure to complete the above may result in the bid being declared non-responsive.

DATE:

(SIGNATURE)

STATE OF:  COUNTY OF:

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

(Name of Individual Signing)

who, after first being duly sworn by me,

affixed his/her signature in the space provided above on this

day of , 20

NOTARY PUBLIC

My Commission Expires:

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3199

**Supplier Name:** Extreme Wood Works of South Florida Inc

**Supplier Contact:** 1

**Supplier Contact Name:** Martha Hernandez

**Date Received:** 09/03/2024 02:25:23 PM

**Date Answered:** 09/11/2024 12:30:10 PM

**Question:** Do you have millwork drawings ?

**Answer:** Contract documents do not specify any millwork.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3326

**Supplier Name:** Danto Builders, LLC

**Supplier Contact:** 1

**Supplier Contact Name:** Tom Brighton

**Date Received:** 09/03/2024 04:57:36 PM

**Date Answered:** 09/11/2024 12:32:48 PM

**Question:** Hello, what is the estimated budget for this project?

**Answer:** The estimated cost is \$2,122,222 including alternates.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3379

**Supplier Name:** Hycon Build

**Supplier Contact:** 1

**Supplier Contact Name:** Antonietta Gaeta

**Date Received:** 09/04/2024 10:59:47 AM

**Date Answered:** 09/17/2024 12:13:55 PM

**Question:** Good morning,

Is it possible to provide references for similar projects carried out under private contracts?

Not for public buildings, as indicated in:

"Contract and Specifications Package" - Special Conditions - 08. Specific Experience Req

**Answer:** Please refer to Addendum No. 1.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3721

**Supplier Name:** Aarya Construction & Design Inc.

**Supplier Contact:** 1

**Supplier Contact Name:** Eric Sami

**Date Received:** 09/04/2024 11:15:22 AM

**Date Answered:** 09/11/2024 12:32:58 PM

**Question:** For the purpose of determining the bond capacity please provide the estimated dollar amount for this project.

**Answer:** The estimated cost is \$2,122,222 including alternates.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3718

**Supplier Name:** Lunacon Engineering Group, Corp

**Supplier Contact:** 1

**Supplier Contact Name:** Cecilia Fortuno

**Date Received:** 09/04/2024 11:27:16 AM

**Date Answered:** 09/11/2024 12:33:06 PM

**Question:** May we know what's the expected magnitude for this project?

**Answer:** The estimated cost is \$2,122,222 including alternates.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3108

**Supplier Name:** ConstructConnect

**Supplier Contact:** 1

**Supplier Contact Name:** Ashley Welker

**Date Received:** 09/04/2024 12:35:03 PM

**Date Answered:** 09/11/2024 12:33:21 PM

**Question:** Is the plan holders list an actual plan holders list or is this just a general list?

**Answer:** It's a general list.



# Question and Answer

---

<b>Company:</b> 10	<b>Event #:</b> 302-1	<b>Event Name:</b> AES Facility Expansion
<b>Supplier:</b> 3108	<b>Supplier Name:</b> ConstructConnect	
<b>Supplier Contact:</b> 1	<b>Supplier Contact Name:</b> Ashley Welker	
<b>Date Received:</b> 09/04/2024 12:35:30 PM		
<b>Date Answered:</b> 09/11/2024 12:33:29 PM		
<b>Question:</b> Is there an engineer's estimate or budget/range for this project?		
<b>Answer:</b> The estimated cost is \$2,122,222 including alternates.		

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3720

**Supplier Name:** Johns Manville

**Supplier Contact:** 1

**Supplier Contact Name:** Jess Murphy

**Date Received:** 09/05/2024 09:55:09 AM

**Date Answered:** 09/17/2024 12:14:03 PM

**Question:** Regarding the roofing specification (TPO): Exposure to jet fuels leads to rapid absorption and expedited degradation of TPO membranes. Will the City consider bids using a PVC KEE system which offers better resistance to jet fuel?

**Answer:** Please refer to Addendum No. 1.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 2722

**Supplier Name:** Home Express Corp. dba HE-Builders

**Supplier Contact:** 1

**Supplier Contact Name:** Matias Otero

**Date Received:** 09/06/2024 05:05:02 PM

**Date Answered:** 09/11/2024 12:33:39 PM

**Question:** Could you please give us the estimated budget for this project?

**Answer:** The estimated cost is \$2,122,222 including alternates.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3065

**Supplier Name:** sun state general contractors, LLC

**Supplier Contact:** 1

**Supplier Contact Name:** Gerson Carvajal

**Date Received:** 09/09/2024 04:31:10 PM

**Date Answered:** 09/11/2024 12:33:44 PM

**Question:** Please provide a budget for this project. Thanks

**Answer:** The estimated cost is \$2,122,222 including alternates.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 2722

**Supplier Name:** Home Express Corp. dba HE-Builders

**Supplier Contact:** 1

**Supplier Contact Name:** Matias Otero

**Date Received:** 09/11/2024 04:41:08 PM

**Date Answered:** 09/13/2024 12:26:07 PM

**Question:** Could please provide the Pre Bid Meeting Signing Sheet for this project?

**Answer:** The pre-bid meeting sign-in sheets are attached to this answer.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3106

**Supplier Name:** PRM Engineering & Contracting Inc.

**Supplier Contact:** 1

**Supplier Contact Name:** Sam Marsenison

**Date Received:** 09/13/2024 08:03:08 AM

**Date Answered:** 09/13/2024 12:27:11 PM

**Question:** Can you please provide a copy of the pre bid sign in sheet.

**Answer:** The pre-bid meeting sign-in sheets are attached to this answer.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3379

**Supplier Name:** Hycon Build

**Supplier Contact:** 1

**Supplier Contact Name:** Antonietta Gaeta

**Date Received:** 09/13/2024 08:14:14 AM

**Date Answered:** 09/17/2024 12:14:13 PM

**Question:** According to the bid rules, the prime contractor must have previous experience with public buildings. Our company has experience with similar projects but not public buildings. Would this disqualify us from bidding? Can this requirement be removed?

**Answer:** Please refer to Addendum No. 1.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3759

**Supplier Name:** SIKA

**Supplier Contact:** 1

**Supplier Contact Name:** Ellen Walkama

**Date Received:** 09/13/2024 01:14:59 PM

**Date Answered:** 09/17/2024 12:14:17 PM

**Question:** I would like to have sika adhered roofing system as an alternate.

**Answer:** Please refer to Addendum No. 1.



# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 3326

**Supplier Name:** Danto Builders, LLC

**Supplier Contact:** 1

**Supplier Contact Name:** Tom Brighton

**Date Received:** 09/17/2024 05:41:15 PM

**Date Answered:** 09/19/2024 09:31:42 AM

**Question:** Hello Dylan, Please see attached question regarding the 40% self-performance requirement for the FXE-AES Expansion project in Fort Lauderdale. Please let me know if you have any questions or concerns. Thank you!

**Answer:** Thank you very much. We value your feedback and understand your perspective. However, after careful deliberation, we have decided to maintain the requirement as it stands.

# Question and Answer

---

**Company:** 10

**Event #:** 302-1

**Event Name:** AES Facility  
Expansion

**Supplier:** 2084

**Supplier Name:** Di Pompeo Construction Corp.

**Supplier Contact:** 1

**Supplier Contact Name:** John DiPompeo

**Date Received:** 09/19/2024 09:01:50 AM

**Date Answered:** 09/19/2024 09:15:35 AM

**Question:** Please provide the Questionnaire Sheet form that is missing from the Required forms document.

**Answer:** Please find the Questionnaire Sheet attached to this answer.

# Question and Answer

---

**Company:** 10

**Event #:** 302-10

**Event Name:** AES Facility  
Expansion

**Supplier:** 2084

**Supplier Name:** Di Pompeo Construction Corp.

**Supplier Contact:** 1

**Supplier Contact Name:** Estimating Department

**Date Received:** 09/19/2024 04:38:49 PM

**Date Answered:** 09/27/2024 03:38:45 PM

**Question:** Please clarify, where can we locate within the bid documents the details for Total Bid Discount (section 1.05 of General Conditions)?

**Answer:** This question uses language found within the City of Fort Lauderdale Bid/Proposal Certification form. This generic form is used for City-wide solicitations. The following portion of the form does not apply to this solicitation: Total Bid Discount (section 1.05 of General Conditions). Bidders may enter "N/A" into the corresponding field.

# Question and Answer

---

**Company:** 10

**Event #:** 302-10

**Event Name:** AES Facility  
Expansion

**Supplier:** 2084

**Supplier Name:** Di Pompeo Construction Corp.

**Supplier Contact:** 1

**Supplier Contact Name:** Estimating Department

**Date Received:** 09/19/2024 05:02:35 PM

**Date Answered:** 09/27/2024 03:39:02 PM

**Question:** Please clarify, where can we locate within the bid documents the details for question "Total Bid Discount (section 1.05 of General Conditions)"?

**Answer:** This question uses language found within the City of Fort Lauderdale Bid/Proposal Certification form. This generic form is used for City-wide solicitations. The following portion of the form does not apply to this solicitation: Total Bid Discount (section 1.05 of General Conditions). Bidders may enter "N/A" into the corresponding field.

# Question and Answer

---

**Company:** 10

**Event #:** 302-10

**Event Name:** AES Facility  
Expansion

**Supplier:** 2084

**Supplier Name:** Di Pompeo Construction Corp.

**Supplier Contact:** 1

**Supplier Contact Name:** Estimating Department

**Date Received:** 09/19/2024 05:04:45 PM

**Date Answered:** 09/27/2024 03:43:21 PM

**Question:** Please clarify where can we locate within the bid documents the details for question on the Bid Certification form "Check box if your firm qualifies for DBE (section 1.09 of General Conditions)"?

**Answer:** This question uses language found within the City of Fort Lauderdale Bid/Proposal Certification form. This generic form is used for City-wide solicitations. The following portion of the form does not apply to this solicitation: Check box if your firm qualifies for DBE (section 1.09 of General Conditions). The Instructions to Bidders says Disadvantaged Business Enterprise Preference is not applicable to this solicitation (p. IB-5).

# Question and Answer

---

**Company:** 10

**Event #:** 302-10

**Event Name:** AES Facility  
Expansion

**Supplier:** 2084

**Supplier Name:** Di Pompeo Construction Corp.

**Supplier Contact:** 1

**Supplier Contact Name:** Estimating Department

**Date Received:** 09/20/2024 09:16:38 AM

**Date Answered:** 09/27/2024 03:47:19 PM

**Question:** Will Irrigation Plans be provided?

**Answer:** Please refer to the Drawings, Sheets L200 and L201, Note 3.1.

# Question and Answer

---

<b>Company:</b> 10	<b>Event #:</b> 302-10	<b>Event Name:</b> AES Facility Expansion
<b>Supplier:</b> 2084	<b>Supplier Name:</b> Di Pompeo Construction Corp.	
<b>Supplier Contact:</b> 1	<b>Supplier Contact Name:</b> Estimating Department	

**Date Received:** 09/20/2024 09:17:11 AM

**Date Answered:** 10/01/2024 11:54:21 AM

**Question:** Specification pages refer to Interior plan pages for finish schedule Please provide finish plan a.(Three full size samples of each tile specified in Drawing I-001 Interior Notes and Finish Legend.)

**Answer:** Drawing I-001 and finish plan are not needed or provided. However, the finish schedule on sheet A-401 includes the finishes for the project rooms.

# Question and Answer

---

**Company:** 10

**Event #:** 302-10

**Event Name:** AES Facility  
Expansion

**Supplier:** 2084

**Supplier Name:** Di Pompeo Construction Corp.

**Supplier Contact:** 1

**Supplier Contact Name:** Estimating Department

**Date Received:** 09/20/2024 09:17:29 AM

**Date Answered:** 10/01/2024 11:54:58 AM

**Question:** Sheet C100 refers to Sod with Turf reinforcement mat. Please provide a detail.

**Answer:** Plan set has been revised to address this comment. Please refer to Addendum No. 2.



# Question and Answer

---

<b>Company:</b> 10	<b>Event #:</b> 302-10	<b>Event Name:</b> AES Facility Expansion
<b>Supplier:</b> 2084	<b>Supplier Name:</b> Di Pompeo Construction Corp.	
<b>Supplier Contact:</b> 1	<b>Supplier Contact Name:</b> Estimating Department	
<b>Date Received:</b> 09/20/2024 09:17:48 AM		
<b>Date Answered:</b> 10/01/2024 11:55:53 AM		
<b>Question:</b> Supplementary Conditions Item 1.4 .2 Mentions Site lighting and Signalization, where does this occur?		
<b>Answer:</b> Please refer to Drawings, Sheet E301 for site lighting. Outdoor traffic signalization is not part of the scope of work.		

# Question and Answer

---

**Company:** 10

**Event #:** 302-10

**Event Name:** AES Facility  
Expansion

**Supplier:** 2084

**Supplier Name:** Di Pompeo Construction Corp.

**Supplier Contact:** 1

**Supplier Contact Name:** Estimating Department

**Date Received:** 09/20/2024 09:18:07 AM

**Date Answered:** 09/27/2024 03:50:44 PM

**Question:** Please confirm if CCTV Cameras, Access Control and Wireless Access Points are by others. Who provides conduits and pull strings?

**Answer:** Please refer to sheet A401 and E302 on extents of work to be completed by the Awarded Bidder and extents of work to be completed by others.

# Question and Answer

---

**Company:** 10

**Event #:** 302-10

**Event Name:** AES Facility  
Expansion

**Supplier:** 2084

**Supplier Name:** Di Pompeo Construction Corp.

**Supplier Contact:** 1

**Supplier Contact Name:** Estimating Department

**Date Received:** 09/20/2024 09:18:22 AM

**Date Answered:** 09/27/2024 03:51:05 PM

**Question:** Who is providing Tel/Data Cat 6 Runs?

**Answer:** Cat 6 cables to be installed by others.

# Question and Answer

---

**Company:** 10

**Event #:** 302-10

**Event Name:** AES Facility  
Expansion

**Supplier:** 2722

**Supplier Name:** Home Express Corp. dba HE-Builders

**Supplier Contact:** 1

**Supplier Contact Name:** Matias Otero

**Date Received:** 09/20/2024 10:34:34 AM

**Date Answered:** 10/01/2024 11:56:14 AM

**Question:** Could you please give us a bid extension?

**Answer:** Please refer to Addendum No. 2.



## ADDENDUM NO. 1

### ITB Event 302 – AES Facility Expansion

September 17, 2024

This addendum is issued to make the following changes:

- 1. Drawings:** The following sheets are replaced in their entirety: A002, A103, A301, A501. Please refer to Addendum No. 1 – Drawings (uploaded to INFOR under Attachments) for the amended sheets.
- 2. Project Manual:** Section 07 54 19 is replaced in its entirety. Please refer to Addendum No. 1 – Project Manual, Section 07 54 19 (uploaded to INFOR under Attachments) for the amended section.
- 3. Experience Required:** Special Conditions, Section 8 – Specific Experience Required, is hereby amended as follows (words in strikethrough (~~strikethrough~~) are deletions from the existing text:

Prime Contractor shall have previous construction experience in constructing additions/modifications to existing ~~public~~ buildings in the State of Florida within the last ten (10) years. Bidder shall submit proof of having successfully constructed a minimum of three (3) projects of similar scope and scale (or larger) and shall, for each project listed, identify: location; dates of construction; project name and overall scope; scope of work that was self-performed by Contractor; and the client's name, address, telephone number and e-mail address.

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_

Bidder's Signature: \_\_\_\_\_

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



**ADDENDUM NO. 2**  
ITB Event 302 – AES Facility Expansion  
October 1, 2024

This addendum is issued to make the following changes:

**1. Drawings:**

Addendum No. 2 – Drawings replaces Drawings and Addendum No. 1 – Drawings in their entirety. Changes per Addendum No. 1 – Drawings are carried forward and incorporated into Addendum No. 2 – Drawings. Changes made to the Drawings per Addendum No. 2 are as follows:

- a. Sheets replaced in their entirety with revisions surrounded by clouds: Coversheet, G001, C100, C101, C102
- b. New sheet added: C111

**2. Project Manual:**

Addendum No. 2 – Project Manual replaces Project Manual and Addendum No. 1 – Project Manual, Section 07 54 19, in their entirety. Changes per Addendum No. 1 – Project Manual, Section 07 54 19 are carried forward and incorporated into Addendum No. 2 – Project Manual. Changes made to the Project Manual per Addendum No. 2 are as follows:

- a. New section added: ITEM S-102 High Performance Turf Reinforcement Mat

**3. Event Close Date:**

Changed from 10/04/2024 to 10/09/2024 at 2:00 pm (EST)

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_  
Bidder's Signature: \_\_\_\_\_  
Date: \_\_\_\_\_



# City of Fort Lauderdale Public Works

## P12356 FXE AES Facility Expansion

### **Construction Documents Project Manual**

**Bid Documents**

**December 6, 2023**

**HDR Project No. 10142598**

THIS PAGE INTENTIONALLY LEFT BLANK.



## TABLE OF CONTENTS

### **DIVISION 01 — GENERAL REQUIREMENTS**

01 32 16	CONSTRUCTION SCHEDULES .....	4
01 33 00	SUBMITTALS .....	11
01 33 04	OPERATION AND MAINTENANCE MANUALS .....	13
01 41 00	CODES, REGULATIONS, AND GUIDELINES .....	6
01 45 33	SPECIAL INSPECTIONS AND TESTING PROGRAM .....	10
01 65 50	PRODUCT DELIVERY, STORAGE, AND HANDLING .....	2
01 73 20	OPENINGS AND PENETRATIONS IN CONSTRUCTION .....	9
01 74 00	CLEANING .....	4
01 81 10	WIND AND SEISMIC DESIGN CRITERIA .....	3

### **DIVISION 03 — CONCRETE**

03 09 00	CONCRETE .....	23
03 15 19	ANCHORAGE TO CONCRETE .....	10

### **DIVISION 04 — MASONRY**

04 01 20	MASONRY CLEANING .....	3
04 05 13	MASONRY MORTAR AND GROUT .....	6
04 05 23	MASONRY ACCESSORIES .....	8
04 05 50	COLD AND HOT WEATHER MASONRY CONSTRUCTION .....	3
04 22 00	CONCRETE MASONRY .....	13

### **DIVISION 05 — METALS**

05 21 00	STEEL JOISTS .....	9
05 30 00	METAL DECK .....	13
05 50 00	METAL FABRICATIONS .....	29

### **DIVISION 06 — WOOD, PLASTICS AND COMPOSITES**

06 10 00	ROUGH CARPENTRY .....	11
----------	-----------------------	----

### **DIVISION 07 — THERMAL AND MOISTURE PROTECTION**

07 21 00	BUILDING INSULATION .....	10
07 26 00	UNDER SLAB VAPOR RETARDER .....	4
07 54 25	FULLY ADHERED TPO ROOFING .....	16
07 62 00	FLASHING AND SHEET METAL .....	12
07 92 00	JOINT SEALANTS .....	10

### **DIVISION 08 — OPENINGS**

08 11 13	HOLLOW METAL (HM) DOORS AND FRAMES .....	25
08 33 23	OVERHEAD COILING DOORS (CD) .....	12
08 41 13	LOW-RISE ALUMINUM STOREFRONT .....	15
08 70 00	FINISH HARDWARE .....	19
08 81 23	EXTERIOR GLASS AND GLAZING .....	11
08 90 00	LOUVERS AND VENTS .....	4

**TABLE OF CONTENTS****DIVISION 01 — GENERAL REQUIREMENTS**

01 32 16	CONSTRUCTION SCHEDULES .....	4
01 33 00	SUBMITTALS.....	11
01 33 04	OPERATION AND MAINTENANCE MANUALS .....	13
01 41 00	CODES, REGULATIONS, AND GUIDELINES.....	6
01 45 33	SPECIAL INSPECTIONS AND TESTING PROGRAM .....	10
01 65 50	PRODUCT DELIVERY, STORAGE, AND HANDLING .....	2
01 73 20	OPENINGS AND PENETRATIONS IN CONSTRUCTION.....	9
01 74 00	CLEANING.....	4
01 81 10	WIND AND SEISMIC DESIGN CRITERIA .....	3

**DIVISION 03 — CONCRETE**

03 09 00	CONCRETE .....	23
03 15 19	ANCHORAGE TO CONCRETE.....	10

**DIVISION 04 — MASONRY**

04 01 20	MASONRY CLEANING .....	3
04 05 13	MASONRY MORTAR AND GROUT.....	6
04 05 23	MASONRY ACCESSORIES.....	8
04 05 50	COLD AND HOT WEATHER MASONRY CONSTRUCTION .....	3
04 22 00	CONCRETE MASONRY.....	13

**DIVISION 05 — METALS**

05 21 00	STEEL JOISTS .....	9
05 30 00	METAL DECK .....	13
05 50 00	METAL FABRICATIONS .....	29

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

06 10 00	ROUGH CARPENTRY.....	11
----------	----------------------	----

**DIVISION 07 — THERMAL AND MOISTURE PROTECTION**

07 21 00	BUILDING INSULATION .....	10
07 26 00	UNDER SLAB VAPOR RETARDER.....	4
07 54 19	PVC MEMBRANE ROOFING - FULLY ADHERED.....	7
07 62 00	FLASHING AND SHEET METAL .....	12
07 92 00	JOINT SEALANTS.....	10

**DIVISION 08 — OPENINGS**

08 11 13	HOLLOW METAL (HM) DOORS AND FRAMES .....	25
08 33 23	OVERHEAD COILING DOORS (CD) .....	12
08 41 13	LOW-RISE ALUMINUM STOREFRONT .....	15
08 70 00	FINISH HARDWARE .....	19
08 81 23	EXTERIOR GLASS AND GLAZING .....	11
08 90 00	LOUVERS AND VENTS .....	4

**DIVISION 09 — FINISHES**

09 22 16	NON-STRUCTURAL METAL FRAMING .....	19
09 24 24	PORTLAND CEMENT STUCCO .....	11
09 29 00	GYPSUM BOARD .....	8
09 30 00	PORCELAIN TILE .....	28
09 51 00	ACOUSTICAL CEILINGS (ACT) .....	17
09 53 00	ACOUSTIC SUSPENSION SYSTEM .....	5
09 65 00	VINYL COMPOSITION TILE FLOORING AND RESILIENT BASE .....	7
09 91 10	ARCHITECTURAL PAINTING .....	16

**DIVISION 10 — SPECIALTIES**

10 14 23	SIGNS .....	4
10 44 00	FIRE PROTECTION SPECIALTIES .....	13

**DIVISION 21 — FIRE SUPPRESSION**

21 05 00	FIRE PROTECTION SYSTEMS .....	12
----------	-------------------------------	----

**DIVISION 22 — PLUMBING**

22 05 03	PIPE AND PIPE FITTINGS - PLUMBING SYSTEMS .....	18
22 05 23	GENERAL-DUTY VALVES FOR PLUMBING PIPING .....	6
22 05 29	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT .....	12
22 05 53	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT .....	6
22 15 00	GENERAL SERVICE COMPRESSED-AIR SYSTEMS .....	8
22 20 00	PLUMBING FIXTURES AND EQUIPMENT .....	19

**DIVISION 23 — HEATING VENTILATING AND AIR CONDITIONING**

23 05 13	COMMON MOTOR REQUIREMENTS FOR PLUMBING [AND HVAC] EQUIPMENT ....	10
23 05 48	VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT .....	3
23 05 53	IDENTIFICATION FOR HVAC, DUCTWORK, PIPING AND HVAC EQUIPMENT .....	3
23 05 93	HVAC SYSTEMS - BALANCING AND TESTING .....	5
23 09 00	INSTRUMENTATION AND CONTROL FOR HVAC SYSTEMS .....	17
23 31 00	HVAC - DUCTWORK .....	15
23 34 00	HVAC - FANS .....	18
23 74 36	REFRIGERANT PIPING SYSTEM .....	3
23 80 00	HVAC - EQUIPMENT .....	4

**DIVISION 26 — ELECTRICAL**

26 05 00	ELECTRICAL - BASIC REQUIREMENTS .....	10
26 05 19	WIRE AND CABLE - 600 VOLT AND BELOW .....	15
26 05 26	GROUNDING AND BONDING .....	10
26 05 33	RACEWAYS AND BOXES .....	24
26 24 16	PANELBOARDS .....	4
26 24 19	MOTOR CONTROL EQUIPMENT .....	11
26 27 26	WIRING DEVICES .....	16
26 28 00	OVERCURRENT AND SHORT CIRCUIT PROTECTIVE DEVICES .....	9
26 28 16	SAFETY SWITCHES .....	4
26 41 13	LIGHTNING PROTECTION SYSTEM .....	11
26 43 13	LOW VOLTAGE SURGE PROTECTION DEVICES (SPD) .....	12
26 50 00	INTERIOR AND EXTERIOR LIGHTING .....	26

**DIVISION 28 — ELECTRONIC SAFETY AND SECURITY**

28 31 00	FIRE ALARM SYSTEM.....	16
----------	------------------------	----

**DIVISION 40 — PROCESS INTERCONNECTIONS**

40 42 00	PIPE, DUCT AND EQUIPMENT INSULATION .....	5
----------	---	---

**FAA TECHNICAL SPECIFICATIONS**

ITEM F-162 CHAIN-LINK FENCE

**NON-FAA SUPPLEMENTAL ITEMS**

ITEM S-101 PROJECT SURVEY

**SUPPLEMENTAL APPENDICES**

APPENDIX A - GEOTECHNICAL REPORT

**DIVISION 28 — ELECTRONIC SAFETY AND SECURITY**

28 31 00 FIRE ALARM SYSTEM..... 15

**DIVISION 40 — PROCESS INTERCONNECTIONS**

40 42 00 PIPE, DUCT AND EQUIPMENT INSULATION ..... 5

**FAA TECHNICAL SPECIFICATIONS**

ITEM F-162 CHAIN-LINK FENCE

**NON-FAA SUPPLEMENTAL ITEMS**

ITEM S-101 PROJECT SURVEY

ITEM S-102 HIGH PERFORMANCE TURF REINFORCEMENT MAT

**SUPPLEMENTAL APPENDICES**

APPENDIX A - GEOTECHNICAL REPORT



THIS PAGE INTENTIONALLY LEFT BLANK.



# DIVISION 01

## GENERAL REQUIREMENTS

THIS PAGE INTENTIONALLY LEFT BLANK.



## **SECTION 01 32 16 CONSTRUCTION SCHEDULES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. Work Includes:
1. During the Bidding phase each bidder shall provide a proposed schedule from notice to proceed to final issue of certificate of occupancy. The proposed schedule shall also include phasing and hours per regular work week, after hours, and weekend work to ensure the facility can maintain regular operations during construction. The proposed schedule will be evaluated with the proposed cost prior to selecting a contractor.
  2. Upon award of the Contract, Contractor shall prepare and submit a Contractor's construction schedule for the Work for the Owner's and Architect's information.
    - a. Submit in expeditious manner.
    - b. Schedule shall not exceed time limits current under Contract Documents, shall be revised at appropriate intervals as required by conditions of the Work and Project, shall be related to entire Project to extent required by Contract Documents, and shall provide for expeditious and practicable execution of Work.
  3. Coordinate Subcontractors' schedules for entire Project:
    - a. Secure time commitments for performing critical elements of Work from parties involved.
    - b. Coordinate each element on the schedule with other construction activities; include minor elements involved in sequence of Work.
    - c. Show each activity in proper sequence.
    - d. Indicate graphically the sequences necessary for completion of related portions of Work.
    - e. Resolve conflicts among schedules of Subcontractors.
    - f. Revise as required by conditions and progress of Work.
    - g. Furnish copy of schedules for entire Project to each Subcontractor.
    - h. Coordinate with Section 01 50 00 - Construction Facilities, Temporary Controls and Utilities.
  4. Contractor shall perform Work in general accordance with most recent schedules submitted to Owner and Architect.

#### **1.2 SUBMITTALS**

- A. Project Information:
1. Preliminary Construction Schedule:
    - a. Submit to Owner and Architect prior to date set for Preconstruction Conference and prior to start of Work.
  2. Project Schedules:
    - a. Provide to Owner and Architect within 60 days of start of construction.
  3. Updated Project Schedules:
    - a. Provide to Owner and Architect quarterly.
    - b. Provide if completion date is revised or sequence of Work is revised.

### **PART 2 - PRODUCTS – (NOT USED)**

### **PART 3 - EXECUTION**

#### **3.1 FORM OF SCHEDULES**

- A. Horizontal Bar Chart:

1. Provide separate horizontal bar column for each line item of the approved Schedule of Values.
  2. Indicate each bar with start and completion date of each item, its total dollar value percent to be completed for each month.
  3. Identify each bar column:
    - a. By specification section number, Work element and major component.
    - b. By distinct graphic delineation.
  4. Horizontal time scale:
    - a. Identify first week day of each week.
  5. Scale and spacing:
    - a. Allow space for updating.
  6. As Work progresses, place contrasting mark in each bar to indicate actual progress and completion.
- B. Sheet Size:
1. Maximum 280 x 430 MM 11 x 17 IN.
- C. CPM Schedule:
1. Furnish a CPM schedule covering items of construction with, as a minimum, early/late start and early/late finish and normal float.

### 3.2 CONTENT OF SCHEDULES

- A. Provide complete sequence of construction by activity.
1. Shop drawings, product data and samples:
    - a. Submittal dates as indicated in approved Submittal Schedule.
    - b. Dates reviewed copies will be required.
  2. Decision dates for:
    - a. Selection of finishes.
  3. Product procurement and delivery dates.
  4. Dates product information and delivery of Owner furnished, installed equipment and materials is needed.
- B. Dates for early and late beginning, and completion of each element of construction.
- C. Identify Work of separate floors, or separate phases, or other logically grouped activities.
- D. Show how requirements for phased completion and partial occupancy by Owner affect sequence of Work.
- E. Indicate important stages of construction for each major portion of Work, including submittal review, testing, and installation.
- F. Identify punch list preparation and completion durations, agencies inspections, and Owner occupancy dates.
- G. Show projected percentage of completion for each item of Work as of last day of every month.
- H. Identify restraints and constraints.
- I. Identify critical path and critical portions of entire schedule. There shall be only one critical path and it shall be clearly identified.

### 3.3 UPDATING

- A. Show changes occurring since previous submission of updated schedules.
- B. Indicate progress of each activity, actual verses scheduled start and completion dates, and actual verses scheduled percent complete by month.
- C. Include:
1. Major changes in scope.
  2. Activities modified since previous updating.
  3. Review projections due to changes.

4. Other identifiable changes.
- D. Provide Narrative report Including:
  1. Discussion of problem areas including current and anticipated delay factors and their impact.
  2. Corrective action taken or proposed and its effect.
  3. Effect of change in schedule.
  4. Description of revisions.
    - a. Effect on schedule due to changes to Contract.
    - b. Revisions in duration of activities.
    - c. Other changes that may affect schedule.

### **3.4 DISTRIBUTION**

- A. Distribute copies of revised schedules to:
  1. Owner.
  2. Architect.
  3. Contractors/Subcontractors.
  4. Other concerned parties.
- B. Instruct recipients to report inability to comply and provide detailed requirements and schedule, with suggested remedies.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 01 33 00 SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Mechanics and administration of the submittal process for:
    - a. Shop Drawings.
    - b. Samples.
    - c. Informational submittals.
  - 2. General content requirements for Shop Drawings.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Construction Progress Schedule submittal requirements are specified in Specification Section 01 32 16.
  - 4. Operations and Maintenance Manual submittal requirements are specified in Specification Section 01 33 04.
  - 5. Technical Specification Sections identifying required submittals.

#### **1.2 DEFINITIONS**

- A. Shop Drawings:
  - 1. See General Conditions.
  - 2. Product data and samples are Shop Drawing information.
- B. Informational Submittals:
  - 1. Submittals other than Shop Drawings and samples required by the Contract Documents that do not require review and/or approval by the Engineer.
  - 2. Representative types of informational submittal items include but are not limited to:
    - a. HVAC test and balance reports.
    - b. Installed equipment and systems performance test reports.
    - c. Manufacturer's installation certification letters.
    - d. Instrumentation and control commissioning reports.
    - e. Warranties.
    - f. Service agreements.
    - g. Construction photographs.
    - h. Survey data.
    - i. Health and safety plans.
    - j. Work plans.
    - k. Delegated designs per performance specification requirements
  - 3. For-Information-Only submittals upon which the Engineer is not expected to conduct review or take responsive action may be so identified in the Contract Documents.

#### **1.3 SUBMITTAL SCHEDULE**

- A. Schedule of Shop Drawings:
  - 1. Submitted and approved within [20] days of receipt of Notice to Proceed.
  - 2. Account for multiple transmittals under any specification section where partial submittals will be transmitted.
- B. Shop Drawings: Submittal and approval prior to [30] PCT completion of project.
- C. Informational Submittals:
  - 1. Reports and installation certifications submitted within [seven] days of conducting testing, installation, or examination.

2. Submittals showing compliance with required qualifications submitted [20] days prior to any work beginning using the subject qualifications.

D. The submittal schedule shall include the following columns as a minimum:

Submittal Section	Submittal Description	Planned Submittal Date	Submittal Need Date	Actual Submittal Date	Actual Return Date	Disposition

#### 1.4 PREPARATION OF SUBMITTALS

A. General:

1. All submittals and all pages of all copies of a submittal shall be completely legible.
2. Submittals which, in the Engineer's sole opinion, are illegible will be returned without review.
3. Minimize extraneous information for equipment and products not relevant to the submittal.
4. Contractors or vendors written comments on the submittal drawings shall be in green

B. Shop Drawings, Product Data, and Samples:

1. Scope of any submittal and letter of transmittal:
  - a. Limited to one Specification Section.
  - b. Submittals with more than one Specification section included will be rejected.
  - c. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a "Basic Requirements" Specification Section.
2. Numbering letter of transmittal:
  - a. Include as prefix the Specification Section number followed by a series number, "-xx", beginning with "01" and increasing sequentially with each additional transmittal for that Specification Section.
  - b. If more than one submittal under any Specification Section, assign consecutive series numbers to subsequent transmittal letters.
3. Describing transmittal contents:
  - a. Provide listing of each component or item in submittal capable of receiving an independent review action.
  - b. Identify for each item:
    - 1) Manufacturer and Manufacturer's Drawing or data number.
    - 2) Contract Document tag number(s).
    - 3) Unique page numbers for each page of each separate item.
  - c. When submitting "or-equal" items that are not the products of named manufacturers, include the words "or-equal" in the item description.
4. Contractor certification of review and approval:
  - a. Contractor's review and approval certification stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
    - 1) Stamp may be either a wet ink stamp or electronically embedded.
    - 2) Clearly identify the person who reviewed the submittal and the date it was reviewed.
    - 3) Shop Drawing submittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated in the General Conditions."

OR

- b. Execute Exhibit AA, Contractor's Submittal Certification form, to indicate Contractor has reviewed and approved the submittal contents.

- 1) Clearly identify the person who reviewed the submittal and the date it was reviewed."
- c. Submittals containing multiple independent items shall be prepared with each item listed on the letter of transmittal or on an index sheet for all items listing the discrete page numbers for each page of each item, which shall be stamped with the Contractor's review and approval stamp.
  - 1) Each independent item shall have a cover sheet with the transmittal number and item number recorded.
    - a) Provide clear space of 3 IN SQ for Engineer stamping.
  - 2) Individual pages or sheets of independent items shall be numbered in a manner that permits the entire contents of a particular item to be readily recognized and associated with Contractor's certification.
5. Resubmittals:
  - a. Number with original Specification Section and series number with a suffix letter starting with "A" on a (new) duplicate transmittal form.
  - b. Do not increase the scope of any prior transmittal.
  - c. Provide cover letter indicating how each "B", "C", or "D" Action from previous submittal was addressed and where the correction is found in the resubmittal.
  - d. Account for all components of prior transmittal.
    - 1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate.
      - a) Do not include submittal information for items listed with prior "A" or "B" Action in resubmittal.
    - 2) Indicate "Outstanding-To Be Resubmitted At a Later Date" for any prior "C" or "D" Action item not included in resubmittal.
      - a) Obtain Engineer's approval to exclude items.
6. For 8-1/2 x 11 IN, 8-1/2 x 14 IN, and 11 x 17 IN size sheets, provide [five] copies of each submittal for Engineer plus the number required by the Contractor.
  - a. The number of copies required by the Contractor will be defined at the Preconstruction Conference, but shall not exceed [three].
  - b. All other size sheets:
    - 1) Submit one reproducible transparency or high resolution print and one additional print of each Drawing until approval is obtained.
    - 2) Utilize mailing tube; do not fold.
    - 3) The Engineer will mark and return the reproducible to the Contractor for reproduction and distribution.
7. Do not use red color for marks on transmittals.
  - a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
  - b. Engineer will use red marks or enclose marks in a cloud.
8. Transmittal contents:
  - a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Engineer.
  - b. Provide submittal information or marks defining specific equipment or materials utilized on the Project.
    - 1) Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.
  - c. Identify equipment or material project use, tag number, Drawing detail reference, weight, and other Project specific information.
  - d. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.
  - e. Do not modify the manufacturer's documentation or data except as specified herein.
  - f. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets not exceeding 11 x 17 IN pages.
    - 1) Indicate exact item or model and all options proposed by arrow and leader.

- g. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data in addition to information specifically stipulated in the Specification Section.
  - 1) Arrange data and performance information in format similar to that provided in Contract Documents.
  - 2) Provide, at minimum, the detail specified in the Contract Documents.
- h. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet. Any deviation from plans or specifications not depicted in the submittal or included but not clearly noted by the Contractor may not have been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility for any error or deviation from contract requirements.
- 9. Samples:
  - a. Identification:
    - 1) Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, Specification Section or Drawing detail reference, color, range, texture, finish and other pertinent data.
    - 2) If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.
  - b. Include application specific brochures, and installation instructions.
  - c. Provide Contractor's review and approval certification stamp or Contractor's Submittal Certification form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.
  - d. Resubmit revised samples of rejected items.
- C. Informational Submittals:
  - 1. Prepare in the format and detail specified in Specification requiring the informational submittal.

## 1.5 TRANSMITTAL OF SUBMITTALS

- A. Shop Drawings and Samples:
  - 1. Transmit all submittals digitally to:
    - [Raheel.Dossani@hdrinc.com](mailto:Raheel.Dossani@hdrinc.com)
    - [kmyat@fortlauderdale.gov](mailto:kmyat@fortlauderdale.gov)
  - 2. Utilize two copies of attached Exhibit A to transmit all Shop Drawings and samples.
  - 3. All submittals must be from Contractor.
    - a. Submittals will not be received from or returned to subcontractors.
- B. Informational Submittals:
  - 1. Transmit under Contractor's standard letter of transmittal or letterhead.
  - 2. Submit in triplicate or as specified in individual Specification Section.
  - 3. Transmit all submittals digitally to:
    - [Raheel.Dossani@hdrinc.com](mailto:Raheel.Dossani@hdrinc.com)
    - [kmyat@fortlauderdale.gov](mailto:kmyat@fortlauderdale.gov)



**C. Electronic Transmission of Submittals:**

1. Transmittals shall be made electronically.
  - a. Use email.
  - b. Protocols and processes will be determined at the Pre-Construction Conference.
2. Provide documents in Adobe Acrobat Portable Document Format (PDF), latest version.
3. Do not password protect or lock the PDF document.
4. Drawings or other graphics must be converted to PDF file format from the original drawing file format and made part of the PDF document.
  - a. Scanning of drawings is to be used only where actual file conversion is not possible and drawings must be scanned at a resolution of 300 DPI or greater.
  - b. Required signatures may be applied prior to scanning for transmittal.
5. Electronic drawings shall be formatted to be at full-scale (or half-scale when printed to 11x17).
  - a. Do not reduce drawings by more than 50 PCT in size.
  - b. Reduced drawings shall be clearly marked "HALF-SIZE" and shall scale accurately at that size.
6. Rotate sheets that are normally viewed in landscape mode so that when the PDF file is opened the sheet is in the appropriate position for viewing.
7. Create bookmarks in the bookmarks panel for the cover, the Table of Contents, and each major section of the document.
8. Using Adobe Acrobat Standard or Adobe Acrobat Professional, set the PDF document properties, initial view as follows:
  - a. Select File → Properties → Initial View.
  - b. Select the Navigation tab: Bookmarks Panel and Page.
  - c. Select the Page layout: Single Page.
  - d. Select the Magnification: Fit Page.
  - e. Select Open to page: 1.
  - f. Set the file to open to the cover page with bookmarks to the left, and the first bookmark linked to the cover page.
9. Set the PDF file "Fast Web View" option to open the first several pages of the document while the rest of the document continues to load.
  - a. To do this:
    - 1) Select Edit → Preferences → Documents → Save Settings.
    - 2) Check the Save As optimizes for Fast Web View box.
10. File naming conventions:
  - a. File names shall use the convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the Shop Drawing Root number and Z is an ID number used to designate the associated volume.
11. Labeling:
  - a. As a minimum, include the following labeling on all electronic media:
    - 1) Project Name.
    - 2) Equipment Name and Project Tag Number.
    - 3) Project Specification Section.
    - 4) Manufacturer Name.
    - 5) Vendor Name.
12. Binding:
  - a. Include labeled electronic media in a protective case.
    - 1) Bind protective case in three-ring binder, inserted at the front of the Final paper copy submittal.
    - 2) Protective case(s) to have means for securing electronic media to prevent loss (e.g., zip case, flap and strap, or equivalent).

**1.6 ENGINEER'S REVIEW ACTION****A. Shop Drawings and Samples:**

1. Items within transmittals will be reviewed for overall design intent and will receive one of the following actions:
  - a. A - FURNISH AS SUBMITTED.
  - b. B - FURNISH AS NOTED (BY ENGINEER).
  - c. C - REVISE AND RESUBMIT.
  - d. D - REJECTED.
  - e. E - ENGINEER'S REVIEW NOT REQUIRED.
2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp.
  - a. Submittals not stamped by the Contractor or stamped with a stamp containing language other than that specified herein will not be reviewed for technical content and will be returned rejected.
3. In relying on the representation on the Contractor's review and approval stamp, Owner and Engineer reserve the right to review and process poorly organized and poorly described submittals as follows:
  - a. Submittals transmitted with a description identifying a single item and found to contain multiple independent items:
    - 1) Review and approval will be limited to the single item described on the transmittal letter.
    - 2) Other items identified in the submittal will:
      - a) Not be logged as received by the Engineer.
      - b) Be removed from the submittal package and returned without review and comment to the Contractor for coordination, description and stamping.
      - c) Be submitted by the Contractor as a new series number, not as a re-submittal number.
  - b. Engineer, at Engineer's discretion, may revise the transmittal letter item list and descriptions, and conduct review.
    - 1) Unless Contractor notifies Engineer in writing that the Engineer's revision of the transmittal letter item list and descriptions was in error, Contractor's review and approval stamp will be deemed to have applied to the entire contents of the submittal package.
4. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation.
  - a. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.
  - b. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.
5. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:
  - a. The portion of the submittal given "C" or "D" will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference).
    - 1) One copy or the one transparency of the "C" or "D" Drawings will be marked up and returned to the Contractor.
      - a) Correct and resubmit items so marked.
  - b. Items marked "A" or "B" will be fully distributed.
  - c. If a portion of the items or system proposed are acceptable, however, the major part of the individual Drawings or documents are incomplete or require revision, the entire submittal may be given "C" or "D" Action.
    - 1) This is at the sole discretion of the Engineer.
    - 2) In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."
    - 3) Distribution to the Owner and field will not be made (unless previously agreed to otherwise).

6. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Contractor with "C" or "D" Action.
7. Calculations required in individual Specification Sections will be received for information purposes only, as evidence calculations have been stamped by the professional as defined in the specifications and for limited purpose of checking conformance with given performance and design criteria. The Engineer is not responsible for checking the accuracy of the calculations and the calculations will be returned stamped "E. Engineer's Review Not Required" to acknowledge receipt.
8. 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.
9. Transmittals of submittals which the Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" action in a prior submittal, will be returned with action "E. Engineer's Review Not Required."
10. Samples may be retained for comparison purposes.
  - a. Remove samples when directed.
  - b. Include in bid all costs of furnishing and removing samples.
11. Approved samples submitted or constructed, constitute criteria for judging completed work.
  - a. Finished work or items not equal to samples will be rejected.

**PART 2 - PRODUCTS - (NOT USED)****PART 3 - EXECUTION - (NOT USED)****END OF SECTION**

**EXHIBIT A      Shop Drawing Transmittal No.****(Spec Section)      (Series)**

Project Name:		Date Received:	
Project Owner:		Checked By:	
Contractor:	HDR Engineering, Inc.	Log Page:	
Address:	Address:	HDR No.:	
		Spec Section:	
		Drawing/Detail No.:	
Attn:	Attn:	1st. Sub	ReSub.
Date Transmitted:		Previous Transmittal Date:	
Item No.	No. Copies	Description	Action Taken*

Remarks:

\* The Action designated above is in accordance with the following legend:

A - Furnish as Submitted B - Furnish as Noted C - Revise and Submit 1. Not enough information for review. 2. No reproduces submitted. 3. Copies illegible. 4. Not enough copies submitted. 5. Wrong sequence number. 6. Wrong resubmittal number. 7. Wrong spec. section. 8. Wrong form used. 9. See comments. D - Rejected	E - Engineer's review not required 1. Submittal not required. 2. Supplemental Information. Submittal retained for informational purposes only. 3. Information reviewed and approved on prior submittal. 4. See comments. 5. Delegated Design - Submittal received as requested by the Contract Documents. The Engineer did not review the engineering or technical content of the submittal.  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. Any deviation from plans or specifications not depicted in the submittal or included but not clearly noted by the Contractor may not have been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility for any error or deviation from contract requirements.
---	---

Comments:

By		Date	
----	--	------	--

Distribution: Contractor | File | Field | Owner | Other |

Copyright 1991-2013 HDR Engineering, Inc. - Revised July 2014

## EXHIBIT AA

**Contractor's Submittal  
Certification**

Shop Drawing Transmittal No.:

Contract/Project Name:

Company Name:

has

1. reviewed and coordinated this Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
2. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
3. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
4. 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.

- ☐ This Submittal **does not** contain any variations from the requirements of the Contract Documents.
- ☐ This Submittal **does** contain variations from the requirements of the Contract Documents. A separate description of said variations and a justification for them is provided in an attachment hereto identified as:

"Shop Drawing Transmittal No. \_\_\_\_\_ Variation and Justification  
Documentation"

Insert picture file or electronic signature of Authorized  
Representative

\_\_\_\_\_  
Authorized Representative\_\_\_\_\_  
Date

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 01 33 04 OPERATION AND MAINTENANCE MANUALS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Administration of the submittal process for Operation and Maintenance Manuals.
  - 2. Content requirements for Operation and Maintenance Manuals.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. General submittal requirements are specified in Specification Section 01 33 00 - Submittals.
  - 4. Technical Specification Sections identifying required Operation and Maintenance Manual submittals.

#### **1.2 DEFINITIONS**

- A. Equipment Operation and Maintenance Manuals:
  - 1. Contain the technical information required for proper installation, operation and maintenance of process, electrical and mechanical equipment and systems.
- B. Building Materials and Finishes Operation and Maintenance Manuals:
  - 1. Contain the information required for proper installation and maintenance of building materials and finishes.

#### **1.3 SUBMITTALS**

- A. List of all the Operation and Maintenance Manuals required by the Contract as identified in the Technical Specification Sections. These may be referred to as "Operation and Maintenance Data" submittals.
- B. Operation and Maintenance Manuals:
  - 1. Draft and final electronic copies.
  - 2. Final paper copies: [One].

#### **1.4 SUBMITTAL SCHEDULE**

- A. List of Required Operation and Maintenance Manuals:
  - 1. Submit list with Specification Section number and title within [90] days after Notice to Proceed.
- B. Draft Operation and Maintenance Manuals:
  - 1. Submit approvable draft manuals in electronic format (PDF) within [30] days following approval of the respective Shop Drawing.
    - a. Include placeholders or fly sheet pages where information is not final or is missing from the draft manual.
  - 2. All Draft Operation and Maintenance Manuals shall be received by no later than [50] PCT project completion.
- C. Final Operation and Maintenance Manuals:
  - 1. Final approval of Operation and Maintenance Manuals in electronic format (PDF) must be obtained [45] days prior to equipment start-up.
  - 2. Provide paper copies and CD-ROMs of approved final Operation and Maintenance Manuals in electronic format (PDF), a minimum of [30] days prior to equipment start-up.
  - 3. Issue addenda to Final Approved Operation and Maintenance Manual to include:

- a. Equipment data that requires collection after start-up, for example but not limited to HVAC balancing reports, electrical switchgear, automatic transfer switch and circuit breaker settings.
- b. Equipment field testing data.
- c. Equipment start-up reports.

## 1.5 PREPARATION OF SUBMITTALS

### A. General:

1. All pages of the Operation and Maintenance Manual submittal shall be legible.
  - a. Submittals which, in the Engineer's sole opinion, are illegible will be rejected without review.
2. Identify each equipment item in a manner consistent with names and identification numbers used in the Contract Documents, not the manufacturer's catalog numbers.
3. Neatly type any data not furnished in printed form.
4. Operation and Maintenance Manuals are provided for Owner's use, to be reproduced and distributed as training and reference materials within Owner's organization.
  - a. This requirement is:
    - 1) Applicable to both paper copy and electronic files.
    - 2) Applicable to materials containing copyright notice as well as those with no copyright notice.
5. Notify supplier and/or manufacturer of the intended use of Operations and Maintenance Manuals provided under the Contract.

### B. Operation and Maintenance Manual Format and Delivery:

1. Draft electronic submittals:
  - a. Provide manual in Adobe Acrobat Portable Document Format (PDF), latest version.
  - b. Create one (1) PDF file for each equipment Operation and Maintenance Manual.
  - c. Do not password protect or lock the PDF document.
  - d. Scanned images of paper documents are not acceptable. Create the Operation and Maintenance Manual PDF file from the original source document.
  - e. Drawings or other graphics must be converted to PDF file format from the original drawing file format and made part of the PDF document.
  - f. Scanning of drawings is to be used only where actual file conversion is not possible and drawings must be scanned at a resolution of 300 DPI or greater.
  - g. Rotate sheets that are normally viewed in landscape mode so that when the PDF file is opened the sheet is in the appropriate position for viewing.
  - h. Create bookmarks in the bookmarks panel for the Operation and Maintenance Manual cover, the Table of Contents and each major section of the Table of Contents.
  - i. Using Adobe Acrobat Standard or Adobe Acrobat Professional, set the PDF document properties, initial view as follows:
    - 1) Select File → Properties → Initial View.
    - 2) Select the Navigation tab: Bookmarks Panel and Page.
    - 3) Select the Page layout: Single Page Continuous.
    - 4) Select the Magnification: Fit Page.
    - 5) Select Open to page: 1.
    - 6) Set the file to open to the cover page of the manual with bookmarks to the left, and the first bookmark linked to the cover page.
    - 7) Window Options: Check the "Resize window to initial page" box.
  - j. Set the PDF file "Fast Web View" option to open the first several pages of the document while the rest of the document continues to load.
    - 1) To do this:
      - a) Select Edit → Preferences → Documents → Save Settings.



- b) Check the "Save As optimizes for Fast Web View" box.
  - k. PDF file naming convention:
    - 1) Use the Specification Section number, the manufacturer's name and the equipment description, separated by underscores.
    - 2) Example: 46 51 21\_Sanitaire\_Coarse\_Bubble\_Diffusers.pdf.
    - 3) Do not put spaces in the file name.
- 2. Final electronic submittals:
  - a. Submit two copies in PDF file format on two USB flash drives or on two CD-ROM discs (one copy per electronic media), each secured in a protective case.
  - b. Labeling:
    - 1) Provide the following printed labeling on all electronic media:
      - a) Project name.
      - b) Specification Section.
      - c) Equipment names and summary of tag(s) covered.
      - d) Manufacturer name.
      - e) Date (month, year).
  - c. Binding:
    - 1) Include labeled electronic media in a protective case.
      - a) Bind protective case in three-ring binder, inserted at the front of the Final paper copy submittal.
      - b) Protective case(s) to have means for securing electronic media to prevent loss (e.g., zip case, flap and strap, or equivalent).
- 3. Final paper copy submittals:
  - a. Quantity: Provide two copies.
  - b. Paper: 8.5 x 11 IN or 11 x 17 IN bright white, 20 LB paper with standard three-hole punching.
  - c. 3-Ring Binder:
    - 1) Provide D-ring binder with clear vinyl sleeves (i.e. view binder) on front and spine.
    - 2) Insert binder title sheet with the following information under the front and spine sleeves:
      - a) Project name.
      - b) Specification Section.
      - c) Equipment names and summary of tag(s) covered.
      - d) Manufacturer name.
      - e) Date (month, year).
    - 3) Provide plastic sheet lifters prior to first page and following last page.
  - d. Drawings:
    - 1) Provide all drawings at 11 x 17 IN size, triple folded and three-hole punched for insertion into manual.
    - 2) Where reduction is not practical to ensure readability, fold larger drawings separately and place in three-hole punched vinyl envelopes inserted into the binder.
    - 3) Identify vinyl envelopes with drawing numbers.
  - e. Use plastic coated dividers to tab each section of each manual in accordance with the Table of Contents.
- C. Equipment Operation and Maintenance Manual Content:
  - 1. Provide a cover page as the first page of each manual with the following information:
    - a. Manufacturer(s) Name and Contact Information.
    - b. Vendor's Name and Contact Information.
    - c. Date (month, year).
    - d. Project Owner and Project Name.
    - e. Specification Section.
    - f. Project Equipment Tag Numbers.

- g. Model Numbers.
- h. Engineer's Name.
- i. Contractor's Name.
- 2. Provide a Table of Contents for each manual.
- 3. Provide Equipment Record sheets as follows:
  - a. Printed copies of the Equipment Record (Exhibits B1, B2 and B3), as the first tab following the Table of Contents.
    - 1) For Instrumentation and Control equipment, International Society of Automation (ISA) Data Sheets will be acceptable in lieu of the Equipment Record sheets.
  - b. Exhibits B1-B3 are available as Fillable PDF Form documents from the Engineer.
  - c. Each section of the Equipment Record must be completed in detail; simply referencing the related equipment Operation and Maintenance Manual sections for nameplate, maintenance, spare parts or lubricant information is not acceptable.
  - d. For equipment involving separate components (for example, a motor and gearbox), a fully completed Equipment Record is required for each component.
  - e. Submittals that do not include the Equipment Record(s) will be rejected without further content review.
- 4. Provide a printed copy of the Manufacturer's Field Services report as required by Specification Section 01 75 00 following the Equipment Record sheets.
- 5. Provide the following detailed information, as applicable:
  - a. Use equipment tag numbers from the Contract Documents to identify equipment and system components.
  - b. Equipment function, normal and limiting operating characteristics.
  - c. Instructions for assembly, disassembly, installation, alignment, adjustment, and inspection.
  - d. Operating instructions for start-up, normal operation, control, shutdown, and emergency conditions.
  - e. Maintenance instructions, including lubrication instructions if applicable
  - f. Troubleshooting guide.
  - g. Mark each sheet to clearly identify specific products and component parts and data applicable to the installation for the Project; delete or cross out information that does not specifically apply to the Project.
  - h. Parts lists:
    - 1) A parts list and identification number of each component part of the equipment.
    - 2) Exploded view or plan and section views of the equipment with a detailed parts callout matching the parts list.
    - 3) A list of recommended spare parts.
    - 4) List of spare parts provided as specified in the associated Specification Section.
    - 5) A list of any special storage precautions which may be required for all spare parts.
  - i. General arrangement, cross-section, and assembly drawings.
  - j. Electrical diagrams, including elementary diagrams, wiring diagrams, connection diagrams, and interconnection diagrams.
  - k. Factory and field test data and performance curves (if applicable).
  - l. As-constructed fabrication or layout drawings and wiring diagrams.
  - m. Copy of the equipment manufacturer's warranty meeting the requirements of the Contract.
  - n. Copy of any service contracts provided for the specific piece of equipment as part of the Contract.
- 6. Additional information as required in the associated equipment or system Specification Section.

7. Include in Submittal the final, configured control setpoints and similar configurable parameters provided in the equipment.
- D. Building Materials and Finishes Operation and Maintenance Manual Content:
1. Provide a cover page as the first page of each manual with the following information:
    - a. Manufacturer(s) Name and Contact Information.
    - b. Vendor's Name and Contact Information.
    - c. Date (month, year).
    - d. Project Owner and Project Name.
    - e. Specification Section.
    - f. Model Numbers.
    - g. Engineer's Name.
    - h. Contractor's Name.
  2. Provide a Table of Contents for each manual.
  3. Building products, applied materials and finishes:
    - a. Include product data, with catalog number, size, composition and color and texture designations.
    - b. Provide information for ordering custom manufactured products.
  4. Necessary precautions:
    - a. Include product MSDS for each approved product.
    - b. Include any precautionary application and storage guidelines.
  5. Instructions for care and maintenance:
    - a. Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and recommended schedule for cleaning and maintenance.
  6. Moisture protection and weather exposed products:
    - a. Include product data listing, applicable reference standards, chemical composition, and details of installation.
    - b. Provide recommendations for inspections, maintenance and repair.
  7. Additional requirements as specified in individual product specifications.
- E. National Fire Protection Association 70 (National Electrical Code) Documentation:
1. Assemble documented calculations of Arc-Fault Current, Equipment Available Fault Current and Short Circuit Current Rating (SCCR) provided as part of equipment submittals into one O&M manual volume.

## 1.6 TRANSMITTAL OF SUBMITTALS

- A. Operation and Maintenance Manuals.
1. Transmit all submittals to:
    - a. [The address specified in Specification Section 01 33 00 - SUBMITTALS].
  2. Transmittal form: Use Operation and Maintenance Manual Transmittal, Exhibit A.
  3. Transmittal numbering:
    - a. Number each submittal with the Specification Section number followed by a series number beginning with "-01" and increasing sequentially with each additional transmittal, followed by "-OM" (for example: 43 23 14-01-OM).
  4. Submit draft and final Operation and Maintenance Manual in electronic format (PDF) to Engineer, until manual is approved.

## 1.7 ENGINEER'S REVIEW ACTION

- A. Draft Electronic (PDF) Submittals:
1. Engineer will review and indicate one of the following review actions:
    - a. A - ACCEPTABLE
    - b. B - FURNISH AS NOTED
    - c. C - REVISE AND RESUBMIT
    - d. D - REJECTED

2. Submittals marked as Acceptable or Furnish As Noted will be retained; however, the transmittal form will be returned with a request for the final paper and electronic documents to be submitted.
  3. Copies of submittals marked as Revise and Resubmit or Rejected will be returned with the transmittal form marked to indicate deficient areas.
  4. Resubmit until approved.
- B. Final Paper Copy Submittals:
1. Engineer will review and indicate one of the following review actions:
    - a. A - ACCEPTABLE
    - b. D - REJECTED
  2. Submittals marked as Acceptable will be retained with the transmittal form returned as noted.
  3. Submittals marked as Rejected will be returned with the transmittal form marked to indicate deficient areas.
  4. Resubmit until approved.

**PART 2 - PRODUCTS - (NOT USED)****PART 3 - EXECUTION - (NOT USED)****END OF SECTION**



**EXHIBIT A    Operation and Maintenance Manual**  
**Transmittal \_\_\_\_\_ - \_\_\_\_\_ - OM**  
                                (Spec Section) (Series) .

Project Name:		Date Received:	
Project Owner:		Checked By:	
Contractor:	Owner:	Log Page:	
Address:	Address:	HDR No.:	
Attn:	Attn:	1st. Sub.	ReSub.
Date Transmitted:		Previous Transmittal Date:	

No. Copies	Description of Item	Manufacturer	Dwg. or Data No.	Action Taken*

Remarks:  
  


---



---

To:	From:
	HDR Engineering, Inc.
	Date:

\* The Action designated above is in accordance with the following legend:

A - Acceptable, provide one (1) additional paper copy and two (2) electronic copies on CD-ROM for final review.  B - Furnish as Noted  C - Revise and Resubmit This Operation and Maintenance Manual Submittal is deficient in the following area: 1. Equipment Records. 2. Functional description. 3. Assembly, disassembly, installation, alignment, adjustment & checkout instructions. 4. Operating instructions.	5. Lubrication & maintenance instructions. 6. Troubleshooting guide. 7. Parts list and ordering instructions. 8. Organization (binder, binder titles, index & tabbing). 9. Wiring diagrams & schematics specific to installation. 10. Outline, cross section & assembly diagrams. 11. Test data & performance curves. 12. Tag or equipment identification numbers. 13. Inclusion of all components & subcomponents. 14. Other - see comments.
--	--

D - Rejected

Comments:  


---



---



---



---



**EXHIBIT B1**

## Equipment Record

## Equipment Data and Spare Parts Summary

Project Name			Specification Section:
Equipment Name			Year Installed:
Project Equipment Tag No(s).			
Equipment Manufacturer			Project/ Order No.
Address			Phone
Fax	Web Site	E-mail	
Local Vendor/Service Center			
Address			Phone
Fax	Web Site	E-mail	

## MECHANICAL NAMEPLATE DATA

Equip.			Serial No.		
Make			Model No.		
ID No.	Frame No.	HP	RPM	Cap.	
Size	TDH	Imp. Sz.	CFM	PSI	
Other:					

## ELECTRICAL NAMEPLATE DATA

Equip.					Serial No.				
Make					Model No.				
ID No.	Frame No.	HP	V.	Amp.	HZ	PH	RPM	SF	
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating		
Other:									

### SPARE PARTS PROVIDED PER CONTRACT

[illegible]

## RECOMMENDED SPARE PARTS

[illegible]

(Jun 1990; Revised Oct 2001, Revised Nov 2007, Revised 2013) Copyright 1991-2014 HDR Engineering, Inc.



## EXHIBIT B2

## Equipment Record

## Recommended Maintenance Summary

Equipment Description						Project Equip. Tag No(s).								
<b>RECOMMENDED BREAK-IN MAINTENANCE (FIRST OIL CHANGES, ETC.)</b>						<b>INITIAL COMPLETION * FOLLOWING START-UP</b>								
						<b>D</b>	<b>W</b>	<b>M</b>	<b>Q</b>	<b>S</b>	<b>A</b>	<b>RT</b>	<b>Hours</b>	
<b>RECOMMENDED PREVENTIVE MAINTENANCE</b>						<b>PM TASK INTERVAL *</b>								
						<b>D</b>	<b>W</b>	<b>M</b>	<b>Q</b>	<b>S</b>	<b>A</b>	<b>RT</b>	<b>Hours</b>	

\*    D = Daily       W = Weekly       M = Monthly       Q = Quarterly       S = Semiannual       A = Annual       Hours = Run Time Interval

(Jun 1990; Revised Oct 2001, Revised Nov 2007, Revised 2013) Copyright 1991-2014 HDR Engineering, Inc.



## EXHIBIT B3

## Equipment Record

## Lubrication Summary

Equipment Description		Project Equip. Tag No(s).				
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

(Jun 1990; Revised Oct 2001, Revised Nov 2007, Revised 2013) Copyright 1991-2014 HDR Engineering, Inc.



**SECTION 01 41 00**  
**CODES, REGULATIONS, AND GUIDELINES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Project design based on, but not limited to, following codes, regulations, and guidelines.
  - 1. Including:
    - a. Nationally published amendments.
    - b. Local Amendments.
  - 2. Additional requirements may be indicated in specification sections.
- B. Contractor is not required to ascertain Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations, unless they bear upon construction means, methods, techniques or safety and health precautions, however nonconformity discovered by or made known to Contractor shall be reported promptly to Architect.

**1.2 INDEX**

- A. Building Code:
  - 1. Florida Building Code (based on the 2015 IBC).
    - a. Edition: 2017.
- B. Life Safety Code:
  - 1. NFPA Life Safety Code 101.
    - a. Edition: 2015.
- C. Fire Code:
  - 1. Florida Fire Prevention Code (based on the 2015 NFPA 1 & NFPA 101).
    - a. Edition: 2017.
- D. Accessibility:
  - 1. Florida AccessibilityCode.
    - a. Based on the 2010 ADA.
  - 2. codes are listed, and requirements differ, comply with the most stringent language.
    - a. Edition: 2015.
- E. Florida Mechanical Code:
  - 1. Based on the 2015 International Mechanical Code.
    - a. Edition: 2017.
  - 2. See Section 23 05 00.
- F. Florida Plumbing Code:
  - 1. Based on the 2015 International Plumbing Code.
    - a. Edition: 2017.
  - 2. See Section 23 05 00.
- G. Electrical Code:
  - 1. NFPA 70: National Electrical Code.
    - a. Edition: 2014.
  - 2. See Section 26 00 10.
- H. Florida Energy Code:
  - 1. Based on 2015 International Energy Conservation Code.
    - a. Edition: 2017.
  - 2. See Section 26 00 10.
- I. Occupational Safety and Health Standards:

1. OSHA Regulations (Standard 29 CFR) - Part 1910.

**END OF SECTION**

**SECTION 01 45 33**  
**SPECIAL INSPECTIONS AND TESTING PROGRAM**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Contractor responsibilities for special inspection and testing.
  - 2. Special Inspection program and reporting requirements.
  - 3. Attachment A to this Specification Section includes the Submittal of Special Inspections.
  - 4. Attachment B to this Specification Section includes Special Inspector qualifications, reporting requirements, and material specific inspections and tests.
    - a. This information is for the Contractor reference only and is not part of the Contract Documents.
    - b. It is included to assist the Contractor in understanding the Owner-provided Services so that those services may be factored into the Contractor's pricing and schedule.
    - c. The Service Provider(s) responsible for the Owner-provided Services will be selected after Contract award.
- B. Purpose:
  - 1. This Document was developed to address the requirements of the 2020 Florida Building Code FBC, Chapter 17, including:
    - a. One or more special inspectors will be hired by the Owner or the Owner's Agent to provide inspections during constructions on the types of work listed under Section 1704.
  - 2. A Statement of Special Inspections will be submitted to the Building Code Official as a condition for permit issuance. This statement is included as Attachment A to this Specification. Attachment B includes a complete list of materials and work requiring special inspections, the inspections to be performed and a list of the minimum qualifications of the individuals, approved agencies or firms intended to be retained for conducting such inspections.
- C. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.

**1.2 DEFINITIONS**

- A. Special Inspector: Representative of the Owner approved inspection agency designated for that portion of the work.
- B. Testing Agency: Approved agency, not affiliated or hired by the Contractor, which is responsible for the materials testing requirements of the project including but not limited to concrete cylinder breaks, soils testing, and masonry materials testing.
- C. Statement of Special Inspections: Document provided to the Building Code Official outlining special inspections and tests to be done on the project and frequency of required test.
- D. Soils Engineer or Geotechnical Engineer: For the purposes of Special Inspection "Soils Engineer," "Geotechnical Engineering," and "Special Inspector" shall be interchangeable as pertains to the Division 31 specifications.
- E. NICET: National Institute for Certification in Engineering Technologies.

**1.3 CONTRACTOR'S RESPONSIBILITIES**

- A. Cooperate with testing agency personnel, special inspector, and agents of the Building Code Official and provide access to the work.
  - 1. Providing access to the work shall include all labor and facilities to perform inspections and tests as listed in the specifications for the duration of the inspections or tests involved.
  - 2. Provide means to obtain and handle samples taken on site.
- B. Attend a pre-construction meeting to coordinate and clarify inspection and testing procedures, requirements.
- C. Notify special inspector and/or testing agency of work to be inspected/tested minimum of 24 HRS prior.
- D. Work for which special inspections are required shall remain accessible and exposed for the purposes of special inspections until completion of required special inspections.
- E. Any portion of work that is not in conformance shall be corrected and re-inspected. Such portions of the work shall not be covered or concealed until authorized by Owner's Representative.
- F. Work to be inspected should be complete at time of inspector's arrival on-site.
- G. Payment for Special Inspection services will be in accordance with the following:
  - 1. Payment described below is for the Testing Agency and Special Inspector costs and does not include the Contractor's costs listed in Paragraph 1.3 A.
  - 2. After Contractor notification, inspector arrives at site and performs inspection within the timeframe defined in Item 4 below.
    - a. Inspection reveals work is satisfactory.
    - b. Owner pays all costs associated with this inspection.
  - 3. After Contractor notification, inspector arrives at site and performs inspection within the timeframe defined in Item 4 below.
    - a. Inspection reveals work is deficient.
    - b. Contractor corrects deficiencies within timeframe defined in Item 4) below.
    - c. Work is re-inspected and work is satisfactory.
    - d. Owner pays all costs associated with this inspection.
  - 4. After Contractor notification, inspector arrives at site and work is not ready for inspection when inspector arrives.
    - a. Inspector will remain on-site for a maximum of 2 HRS awaiting the completion of the work.
    - b. If work is not ready for inspection at the end of this period, inspector will be dismissed until Contractor requests re-inspection.
    - c. All costs associated with this inspection trip will be charged to the Contractor.
  - 5. After Contractor notification, inspector arrives at site and performs inspection within the timeframe defined above.
    - a. Inspection reveals work is deficient.
    - b. Contractor attempts to correct deficiencies within 2 HR timeframe and calls for re-inspection.
    - c. Work is re-inspected and found to still be deficient.
    - d. Inspector will be dismissed.
    - e. All costs associated with this inspection trip will be charged to the Contractor.
  - 6. Owner will pay for "passing" soils on the Project. Costs of corrective actions and cost of failed test areas requiring retesting are the sole responsibility of the Contractor. For additional specific payment requirements for soils see the respective Division 31 Section.
- H. Special Inspection is intended to be an independent quality assurance. Special Inspections shall not relieve the Contractor of any quality assurance, quality control, workmanship, or warranty responsibilities. Contractor's own personnel shall review all

work to be inspected for conformance with Contract Documents prior to calling for inspection.

#### **1.4 REPORTING DUTIES AND AUTHORITY**

- A. A pre-construction meeting to coordinate and clarify inspection, testing, and procedural requirements will be held per Section 01 30 00.
  - 1. The meeting is to be attended by:
    - a. Owner.
    - b. Engineer.
    - c. Building Code Official or designee.
    - d. Testing Agency and Special Inspectors.
    - e. General Contractor.
    - f. Appropriate Sub-contractor(s).
- B. Special Inspector shall report all deficient work to the Contractor as soon as possible.
  - 1. Deficient work that has been covered up or concealed prior to re-inspection shall be reported to the Engineer and the Building Code Official.
- C. Special Inspector does not have authority to stop work or modify the requirements of the Contract Documents.

#### **PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)**

#### **PART 3 - EXECUTION - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)**

**END OF SECTION**

**ATTACHMENT A TO SECTION 01 45 33  
SUBMITTAL OF SPECIAL INSPECTIONS**

STATEMENT DATE: TBD

PROJECT NAME: AES FACILITY EXPANSION  
PROJECT ADDRESS: 6000 NW 21<sup>ST</sup> AVE, FORT LAUDERDALE, FL 33309  
OWNER: CITY OF FORT LAUDERDALE  
REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE (DPRC): M. ERIC MARTIN, PE

The Statement of Special Inspections (Statement) is submitted as a condition for permit issuance in accordance with the Special Inspection requirements of the Building Code. The Special Inspection program is outlined in Specification Section 01 45 33 and Attachments A and B. A detailed explanation of the requirements for Special Inspections and Testing can be found in specification Section 01 45 33 of the Project Manual in conjunction with the Technical Specifications for each material.

Monthly Special Inspection reports will be submitted to the DPRC and the Building Official. Discovered discrepancies will be brought to the immediate attention of the Contractor for correction. If the discrepancies are not corrected, the discrepancies will be brought to the attention of the DPRC and the Building Official. Only documents that are prepared and signed or sealed by the Special Inspectors (SI) are valid.

The SI is responsible for verifying all information on each document prior to signing or sealing and directly forwarding it to the DPRC and Building Official. The SI is responsible for verifying all inspectors under his supervision maintain current certifications during the course of the project. At the conclusion of each individual Special Inspection type, the SI will complete a Final Report.

The Special Inspection program does not relieve the Contractor or any other entity of any contractual duties, including quality control, quality assurance, or safety. The Contractor is solely responsible for construction means, methods, and job site safety. Failure to adhere to the SI program as outlined herein may result in a stop work notice being issued by the Building Official.

Respectfully submitted,  
Design Professional in Responsible Charge,

M. Eric Martin, PE  
Type or Print Name

PE License # 78675  
Expires: 2/28/21

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**END OF ATTACHMENT A**

**ATTACHMENT B TO SECTION 01 45 33  
SPECIAL INSPECTIONS, INSPECTOR QUALIFICATIONS AND REPORTING  
REQUIREMENTS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 03 09 00 - Concrete.
  - 4. Section 04 22 00 - Concrete Masonry.
  - 5. Section 05 50 00 - Metal Fabrications.
  - 6. Section 31 23 00 - Earthwork.

**1.2 QUALIFICATIONS**

- A. Qualifications stated here are the minimum recommended by the Engineer. If the Building Code Official has more stringent qualifications, the more stringent qualifications will take precedence.
- B. All Special Inspections and Testing to be done under the direction of a Professional Engineer or Registered Architect registered in the State of Florida herein referred to as Registered Professional for Special Inspections (RPSI).
- C. Soil, concrete, masonry, mortar, grout, steel and aluminum related testing.
  - 1. The Testing Agency shall have a minimum of 10 years' experience in the testing of these materials.
  - 2. The Testing Agency's technician(s) conducting this testing:
    - a. Shall have a minimum of five years' experience in the testing of soil, concrete, mortar, grout, steel and aluminum as appropriate.
  - 3. Concrete related work:
    - a. International Code Council certification for Reinforced Concrete and American Concrete Institute Concrete Field Testing Technician – Grade 1.
- D. Special Structural Inspections:
  - 1. Professional Engineers or Architects, licensed in the State of Florida, may perform special inspections in accordance with their license qualifications.
  - 2. Other individuals, working under the direct supervision of a licensed engineer and meeting the following qualifications, may perform special inspections.
  - 3. Soils related work:
    - a. NICET Level II Certification in geotechnical engineering technology/construction; or
    - b. Registered Geologist; or
    - c. Engineer Intern under the direct supervision of a Licensed Professional Engineer.
  - 4. Concrete related work:
    - a. International Code Council certification for Reinforced Concrete Special Inspector or American Concrete Institute Concrete Construction Special Inspector.
    - b. Alternatively, may be an Engineer Intern under the direct supervision of a Licensed Professional Engineer.
  - 5. Precast concrete erection related work:
    - a. Engineer Intern under the direct supervision of a Licensed Professional Engineer.
  - 6. Precast concrete erection welding:
    - 1) American Welding Society as a Certified Welding Inspector; or
    - 2) International Code Council Structural Steel and Welding Certification and American Welding Society Qualified and one year of related experience; or
    - 3) NDT Level II or II Certificate (for non-destructive testing only).

7. Masonry related work:
  - a. Shall be certified by the International Code Council or American Concrete Institute for structural masonry and one year of related experience.
  - b. Alternatively, may be an Engineer Intern with a minimum of two years appropriate training.
8. Steel and aluminum related work:
  - a. Frame and material verification FBC Chapter 17:
  - b. Welding:
    - 1) American Welding Society as a Certified Welding Inspector; or
    - 2) International Code Council Structural Steel and Welding Certification and American Welding Society Qualified and one year of related experience; or
    - 3) NDT Level II or II Certificate (for non-destructive testing only).
  - c. High strength bolting:
    - 1) International Code Council Structural Steel and Welding Certification and one year related experience.
    - 2) Alternatively, may be an Engineer Intern with appropriate training.
9. Fire resistive coating (intumescent paint) related work:
  - a. International Code Council Spray-Applied Fireproofing Certification and three years of related experience; or
  - b. International Code Council Fire Inspector 1 Certification and three years of related experience.
10. Other equivalent certifications will not be acceptable unless approved by the Engineer.

### 1.3 REPORTING DUTIES AND AUTHORITY

- A. Reporting requirements for special inspector per FBC Chapter 17 for Building System Related Work.
  1. Comply with requirements of FBC and local jurisdiction requirements.
  2. Provide written documentation of all inspections and testing.
    - a. Include exact location of work.
    - b. If testing of specimens is included, include detailed information on storage and curing of specimens prior to testing.
  3. Furnish inspection and test reports to the Contractor, the Engineer's Project Manager and the Owner's on-site representative.
    - a. Indicate that work inspected was done in conformance with approved construction documents.
    - b. Immediately report any discrepancies to the Contractor for correction.
    - c. If the discrepancies are not corrected in a timely fashion, notify the Engineer's Project Manager and Owner's on-site representative.
  4. Issue an electronic report summarizing all inspections, corrective action notifications and resolution of discrepancies and non-conforming work every two weeks (14 calendar days).
    - a. Copy will be available to:
      - 1) Engineer's Project Manager.
      - 2) Owner.
      - 3) The Building Code Official.
      - 4) General Contractor.
  5. At the end of the Project, the RPSI shall compile all test reports for each inspected material and for each Special Inspector and summarize into a single PDF and submit to the Engineer and Building Code Official.
    - a. Final summary report to be signed and sealed by a Registered Professional for Special Inspections stating:
      - 1) The required Special Inspections have been performed.
      - 2) All discrepancies have been resolved except as specifically stated in the summary report.
- B. Special Inspector shall report all deficient work to the Contractor as soon as possible.



1. Deficient work that has been covered up or concealed prior to re-inspection shall be reported to the Engineer and the Building Code Official.
- C. Special Inspector does not have authority to stop work or modify the requirements of the Contract Documents.

#### **1.4 MATERIAL SPECIFIC SPECIAL INSPECTIONS AND TESTS**

- A. Material specific requirements for special inspection and testing are listed in the technical specifications listed below. Special inspection and testing requirements will be located in each appropriate technical specification under "SOURCE QUALITY CONTROL", "FIELD QUALITY CONTROL" and/or "QUALITY ASSURANCE" as appropriate for each material.

#### **1.5 SOILS**

- A. Special Inspection/testing will be provided per FBC and per local jurisdiction requirements. as required to determine that the site has been prepared in accordance with the approved soils report, and to verify the allowable soil bearing pressure, materials, compaction densities, trenching and backfill and conformance to the project Specifications.
- B. Inspection/testing requirements are listed separately in Specification Division 31 and are indicated as the work to be done by the Geotechnical Engineer, Testing Agency, or Special Inspections and Testing Provider.

#### **1.6 CONCRETE**

- A. Special Inspection and testing will be provided per FBC. Inspection is required for material verification, reinforcing steel, embedded bolts, mechanical splices, concrete tests, welding of reinforcing, concrete placement and curing, and waterstop placement.
- B. Inspection and testing requirements are listed separately in Specification Section 03 09 00 and are indicated as the work to be done by the Special Inspector or Testing Agency.

#### **1.7 MASONRY**

- A. Special Inspection and testing will be provided per FBC and local jurisdiction requirements. Inspection is required for material tests and verification, reinforcing steel, embedded bolts and anchorage, grout placement, and welding of reinforcing.
- B. Inspection/testing requirements are listed separately in Specification Section 04 22 00 and are indicated as the work to be done by the Special Inspector.

#### **1.8 STEEL, STAINLESS STEEL, AND ALUMINUM**

- A. Special Inspection will be provided for structural steel and aluminum per AISC 360. Inspection is required for material verification, high-strength bolting, welding and other work noted on the Contract Documents.
- B. Inspection/testing requirements are listed separately in Section 05 50 00 and are indicated as the work to be done by the Special Inspector. Inspection requirements listed are applicable to aluminum, stainless steel, and structural steel.

### **PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS ATTACHMENT)**

### **PART 3 - EXECUTION - (NOT APPLICABLE TO THIS ATTACHMENT)**

**END OF ATTACHMENT B**

THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 01 65 50**  
**PRODUCT DELIVERY, STORAGE, AND HANDLING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Scheduling of product delivery.
  - 2. Packaging of products for delivery.
  - 3. Protection of products against damage from:
    - a. Handling.
    - b. Exposure to elements or harsh environments.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
- C. Payment:
  - 1. No payment will be made to Contractor for equipment or materials not properly stored and insured or without approved Shop Drawings.
    - a. Previous payments for items will be deducted from subsequent progress estimate(s) if proper storage procedures are not observed.

**1.2 DELIVERY**

- A. Scheduling: Schedule delivery of products or equipment as required to allow timely installation and to avoid prolonged storage.
- B. Packaging: Deliver products or equipment in manufacturer's original unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.
- C. Identification: Clearly and fully mark and identify as to manufacturer, item, and installation location.
- D. Protection and Handling: Provide manufacturer's instructions for storage and handling.

**PART 2 - PRODUCTS - (NOT USED)****PART 3 - EXECUTION****3.1 PROTECTION, STORAGE AND HANDLING**

- A. Manufacturer's Instruction:
  - 1. Protect all products or equipment in accordance with manufacturer's written directions.
    - a. Store products or equipment in location to avoid physical damage to items while in storage.
    - b. Handle products or equipment in accordance with manufacturer's recommendations and instructions.
  - 2. Protect equipment from exposure to elements and keep thoroughly dry.
  - 3. When space heaters are provided in equipment, connect and operate heaters during storage until equipment is placed in service.

**3.2 STORAGE FACILITIES**

- A. Temporary Storage Building:
  - 1. Provide a weatherproof temporary storage building specifically for the purpose of providing for protection of products and equipment.

- a. Size building to accommodate anticipated storage items.
2. Equip building with lockable doors and lighting, and provide electrical service for equipment space heaters and heating or ventilation as necessary to provide storage environments acceptable to specified manufacturers.
3. Provide methods of storage of products and equipment off the ground.
4. Provide this structure within 60 days after Notice to Proceed.
  - a. Locate building on-site where shown on the Drawings or in location approved by Engineer.
  - b. Remove building from site prior to startup and demonstration period.

### **3.3 FIELD QUALITY CONTROL**

- A. Inspect Deliveries:
  1. Inspect all products or equipment delivered to the site prior to unloading.
    - a. Reject all products or equipment that are damaged, used, or in any other way unsatisfactory for use on Project.
- B. Monitor Storage Area: Monitor storage area to ensure suitable temperature and moisture conditions are maintained as required by manufacturer or as appropriate for particular items.

**END OF SECTION**

## **SECTION 01 73 20**

### **OPENINGS AND PENETRATIONS IN CONSTRUCTION**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Methods of installing and sealing openings and penetrations in construction.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 05 50 00 - Miscellaneous Metals.
  - 4. Section 06 82 00 - Fiberglass Reinforced Plastic Fabrications.
  - 5. Section 07 62 00 - Flashing and Sheet Metal.
  - 6. Section 07 84 00 - Firestopping.
  - 7. Section 07 92 00 - Joint Sealants.
  - 8. Section 09 96 00 - High Performance Industrial Coatings.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. A36, Standard Specification for Carbon Structural Steel.
    - b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - c. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
    - d. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
    - e. A351, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
    - f. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
    - g. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - h. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
    - i. A995, Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts.
  - 2. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC):
      - 1) Article 501, Class 1 Locations.
    - b. 90A, Standard for Installation of Air Conditioning and Ventilating Systems.
    - c. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

##### **1.3 DEFINITIONS**

- A. Corrosive Areas: For the purpose of this specification section, the following areas are defined as corrosive:
  - 1. N/A
- B. Hazardous Areas: Areas shown in the Contract Documents as having Class I or Class II area classifications.
- C. Washdown Areas: Areas having floor drains or hose bibbs.

##### **1.4 SUBMITTALS**

- A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. For each structure provide dimensioned or scaled (minimum 1/8 IN = 1 FT) plan view drawings containing the following information:
  - a. Vertical and horizontal location of all required openings and penetrations.
  - b. Size of all openings and penetrations.
  - c. Opening type.
  - d. Seal type.
3. Manufacturer's installation instructions for standard manufactured products.

## 1.5 SITE CONDITIONS

- A. For purposes of this Project, water table level is elevation as shown in the attached geotechnical report.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Pipe Sleeves:
  1. Areas listed as Corrosive Areas in PART 1:
    - a. Stainless steel, Type [304L][316L].
    - b. Penetrations 24 IN DIA or less: ASTM A269, ASTM A312 or ASTM A554, Schedule 40.
    - c. Penetrations larger than 24 IN DIA: Stainless steel, ASTM A666, Minimum 1/4 IN thickness.
  2. All other Areas:
    - a. Steel, Hot-dipped galvanized after fabrication.
    - b. Penetrations 24 IN DIA or less: ASTM A53, Schedule 40.
    - c. Penetrations larger than 24 IN DIA: ASTM A36, Minimum 1/4 IN thickness.
- B. Backing Rod and Sealant: See Specification Section 07 92 00.
- C. Modular Mechanical Seals:
  1. Acceptable manufacturers:
    - a. Link-Seal.
  2. [304][316] stainless steel bolts, nuts and washers.
- D. Firestopping Material: See Specification Section 07 84 00.
- E. Sheet Metal Sleeves:
  1. Areas listed as Corrosive Areas in PART 1: Stainless steel: ASTM A240, Type [304L][316L].
  2. All other areas: Galvanized steel: ASTM A653, G90.
  3. Minimum 12 GA.
- F. Commercial Wall Castings:
  1. Ductile iron, ASTM A536.
  2. Grade equal to connecting piping system.

## PART 3 - EXECUTION

### 3.1 FABRICATION

- A. Fabricate pipe sleeves in accordance with Specification Section 05 50 00.
- B. Fabricate sheet metal sleeves in accordance with Specification Section 07 62 00.
- C. Provide waterstop plate/anchor flange for piping, ducts, castings and sleeves cast-in-place in concrete.
  1. For fabricated units, weld plate to sleeve, pipe, or ductwork.
  2. For commercial castings, cast water stop/anchor with wall pipe.
  3. Plate is to be same thickness as sleeve, pipe, casting or ductwork.

4. For fabricated units, diameter of plate or flange to be 4 IN larger than outside diameter of sleeve, pipe or ductwork.
5. For commercial castings, waterstop/anchor size to be manufacturer standard.
6. Provide continuous around entire circumference of sleeve, pipe, or ductwork.

D. Factory or shop-coat painted components in accordance with Specification Section 09 96 00.

### 3.2 INSTALLATION AND APPLICATION

- A. Firestopping materials used in fire-resistance rated construction shall be in full compliance with Specification Section 07 84 00.
- B. Seal openings and penetrations in non-fire-resistance-rated construction in accordance with Specification Section 07 92 00.
- C. Obtain prior approval from Engineer when any opening larger than 100 SQIN must be made in existing or newly completed construction.
- D. Perform HVAC penetrations in accordance with NFPA 90A.
- E. Perform electrical penetrations in accordance with NFPA 70, Article 501.
- F. When mechanical or electrical work cannot be installed as structure is being erected, provide and arrange for building-in of boxes, sleeves, insets, fixtures or devices necessary to permit installation later.
  1. Lay out chases, holes or other openings which must be provided in masonry, concrete or other work.
- G. Where pipes, conduits or ducts pass through floors in washdown areas, install sleeves with top 3 IN above finish floors.
  1. In non-washdown areas, install sleeves with ends flush with finished surfaces.
- H. Size sleeves, blockouts and cutouts which will receive sealant seal such that free area to receive sealant is minimized and seal integrity may be obtained.
- I. For insulated piping and ducts, size sleeves, blockouts and cutouts large enough to accommodate full thickness of insulation.
- J. Where pipes, conduits or ducts pass through grating, provide banding at the entire perimeter of the opening.
  1. Metal grating: See Specification Section 05 50 00.
  2. FRP grating: See Specification Section 06 82 00.
- K. Where pipes, conduits or ducts are removed where passing through grating:
  1. Metal grating:
    - a. Provide banding at perimeter and cover opening with 1/4 IN plate of the same material of the grating.
    - b. See Specification Section 05 50 00.
  2. FRP grating:
    - a. Provide full depth cover meeting same loading requirement as existing material or replace grating section.
    - b. See Specification Section 06 82 00.
- L. Do not cut into or core drill any beams, joists, or columns.
- M. Do not install sleeves in beams, joists, or columns.
- N. Do not install recesses in beams, joists, columns, or slabs.
- O. Field Cutting and Coring:
  1. Saw or core drill with non-impact type equipment.
  2. Mark opening and drill small 3/4 IN or less holes through structure following opening outline.
  3. Sawcut opening outline on both surfaces.
    - a. Knock out within sawcuts using impact type equipment.

- b. Do not chip or spall face of surface to remain intact.
  - c. Do not allow any overcut with saw kerf.
- P. Precast-Prestressed Concrete Construction:
  - 1. Do not cut openings or core drill vertically or horizontally through stems of members.
  - 2. Do not locate or install sleeves or recess sleeves vertically or horizontally through or in stems of members.
  - 3. Cast openings and sleeves into flanges of units.
  - 4. Cast openings larger than 6 IN in diameter or 6 IN maximum dimension in units at time of manufacture.
  - 5. Cast openings smaller than 6 IN in diameter or 6 IN maximum dimensions in flanges of units at time of manufacture or field cut.
- Q. Where alterations are necessary or where new and old work join, restore adjacent surfaces to their condition existing prior to start of work.
- R. Where area is blocked out to receive sheet metal sleeve at later date:
  - 1. If blockout size is sufficient to allow placement, utilize dowels for interface of initially placed concrete and sleeve encasement concrete which is placed later.
    - a. Size blockout based on sleeve size required plus 4 to 6 IN each side of sleeve for concrete encasement.
    - b. Provide #4 dowels at 12 IN spacing along each side of blockout with minimum of two dowels required per side.
  - 2. If blockout size is not sufficient to allow placement of dowels, provide keyway along all sides of blockout.
    - a. Size blockout based on sleeve size required plus 2 to 4 IN each side of sleeve for concrete encasement.
- S. For interior wall applications where backer rod and sealant are specified, provide backer rod and sealant at each side of wall.
- T. Refer to Drawings for location of fire-rated walls, floors, and ceilings.
  - 1. Utilize firestopping materials and procedures specified in Specification Section 07 84 00 IN conjunction with scheduled opening type to produce the required fire rating.
- U. Use full depth expanding foam sealant for seal applications where single or multiple pipes, conduits, etc., pass through a single sleeve.
- V. Do not make duct or conduit penetrations below high water levels when entering or leaving tankage, wet wells, or other water holding structures.
- W. Modular Mechanical Seals:
  - 1. Utilize one seal for concrete thickness less than 8 IN and two seals for concrete, 8 IN thick or greater.
  - 2. Utilize two seals for piping 16 IN diameter and larger if concrete thickness permits.
  - 3. Install seals such that bolt heads are located on the most accessible side of the penetration.
- X. Backer Rod and Sealant:
  - 1. Install in accordance with Specification Section 07 92 00.
  - 2. Provide backer rod and sealant for modular mechanical seal applications.
    - a. Apply on top side of slab penetrations and on interior, dry side wall penetrations.

### 3.3 SCHEDULES

- A. General Schedule of Penetrations through Floors, Roofs, Foundation Base Slabs, Foundation Walls, Foundation Footings, Partitions and Walls for Ductwork, Piping, and Conduit:
  - 1. Provide the following opening and penetration types:
    - a. Type A - Block out 2 IN larger than outside dimensions of duct, pipe, or conduits.
    - b. Type B - Saw cut or line-drill opening. Place new concrete with integrally cast sheet metal or pipe sleeve.



- c. Type C - Fabricated sheet metal sleeve or pipe sleeve cast-in-place. Provide pipe sleeve with water ring for wet and/or washdown areas.
  - d. Type D - Commercial type casting or fabrication.
  - e. Type E - Saw cut or line-drill opening. Place new concrete with integrally cast pipe, duct or conduit spools.
  - f. Type F - Integrally cast pipe, duct or conduit.
  - g. Type G - Saw cut or line-drill and remove area 1 IN larger than outside dimensions of duct, pipe or conduit.
  - h. Type H - Core drill.
  - i. Type I - Block out area. At later date, place new concrete with integrally cast sheet metal or pipe sleeve.
  - j. Type J - Grating Banding for any field cut openings.
- 2. Provide seals of material and method described as follows.
    - a. Category 1 - Modular Mechanical Seal.
    - b. Category 2 - Roof curb and flashing according to SMACNA specifications unless otherwise noted on Drawings. Refer to Specification Section 07 62 00 and roofing Specification Sections for additional requirements.
    - c. Category 3 - 12 GA sheet metal drip sleeve set in bed of silicon sealant with backing rod and sealant used in sleeve annulus.
    - d. Category 4 - Backer rod and sealant.
    - e. Category 5 - Full depth compressible sealant with escutcheons on both sides of opening.
    - f. Category 6 - Full depth compressible sealant and flanges on both sides of opening. Flanges constructed of same material as duct, fastened to duct and minimum 1/2 IN larger than opening.
    - g. Category 7 - Full depth compressible sealant and finish sealant or full depth expanding foam sealant depending on application.
    - h. Category 8 - Banding for all grating openings and banding and cover plate of similar materials for abandoned openings.
  - 3. Furnish openings and sealing materials through new floors, roofs, grating, partitions and walls in accordance with Schedule A, Openings and Penetrations for New Construction.
  - 4. Furnish openings and sealing materials through existing floors, grating, roofs, partitions and walls in accordance with Schedule B, Openings and Penetrations for Existing Construction.

**SCHEDULE A. OPENINGS AND PENETRATIONS SCHEDULE  
FOR NEW CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	C F I	7 Not Req 7	D F I <sup>(1)</sup>	Not Req Not Req 7	C F	7 Not Req
Through floors on grade above water table	C F I	4 Not Req 4	C F I <sup>(1)</sup>	7 Not Req 7	C F I <sup>(1)</sup>	4 Not Req 7
Through slab on grade below water table	F	Not Req	F	Not Req	F	Not Req
Through floors in washdown areas	C I	4 4	C H <sup>(2)</sup> I <sup>(1)</sup>	4 3 4	F H <sup>(2)</sup> I <sup>(1)</sup>	Not Req 3 7
Through walls where one side is a hazardous area	C F I	7 Not Req 7	D F I <sup>(1)</sup>	Not Req Not Req 7	C F	7 Not Req
Through exterior wall below grade above water table	C F I	7 Not Req 7	C D F I <sup>(1)</sup>	1 Not Req Not Req 1	F I <sup>(1)</sup>	Not Req 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	C F I	7 Not Req 7	C D F H <sup>(2)</sup>	1 Not Req Not Req 1	C F H <sup>(2)</sup> I <sup>(1)</sup>	7 Not Req 7 7
Through wall from tankage or wet well (below high water level) to dry well or dry area	F	Not Req	F	Not Req	F	Not Req
Through exterior wall above grade	A B C	6 6 6	A B D H <sup>(2)</sup>	5 5 Not Req 5	C H <sup>(2)</sup>	5 4
Roof penetrations	A	2	A	2	A	2
Through interior walls and slabs not covered by the above applications	A C	4 4	A C	4 4	A C F	4 4 Not Req
Grating openings and penetrations	J	8	J	8	J	8

**SCHEDULE B. OPENINGS AND PENETRATIONS SCHEDULE  
FOR EXISTING CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors with bottom side a hazardous location	B E	7 Not Req	B <sup>(1)</sup> E <sup>(3)</sup> H <sup>(2)</sup>	7 Not Req 7	B <sup>(1)</sup> E <sup>(3)</sup> H <sup>(2)</sup>	7 Not Req 7
Through floors on grade above water table	B	7	B	7	B	7
Through slab on grade below water table	E	Not Req	E	Not Req	E	Not Req
Through floors in washdown areas	G	3	G H <sup>(2)</sup>	3 3	G H <sup>(2)</sup>	3 3
Through walls where one side is a hazardous area	B E	7 Not Req	B <sup>(1)</sup> B <sup>(3)</sup> E H <sup>(2)</sup>	7 1 Not Req 7	B <sup>(1)</sup> <sup>(3)</sup> E H <sup>(2)</sup>	7 Not Req 7
Through exterior wall below grade above water table	B	7	B <sup>(1)</sup> B <sup>(3)</sup> H <sup>(2)</sup>	7 1 7	B <sup>(1)</sup> <sup>(3)</sup> H <sup>(2)</sup>	7 7
Through wall from tankage or wet well (above high water level) to dry well or dry area	B E	7 Not Req	B E H <sup>(2)</sup>	1 Not Req 1	B <sup>(1)</sup> <sup>(3)</sup> E H <sup>(2)</sup>	7 Not Req 7
Through wall from tankage or wet well (below high water level) to dry well or dry area	E	Not Req	E	Not Req	E	Not Req
Through exterior wall above grade	G	6	G <sup>(1)</sup> <sup>(3)</sup> H <sup>(2)</sup>	5 5	G <sup>(1)</sup> <sup>(3)</sup> H <sup>(2)</sup>	5 7
Roof penetrations	G	2	G <sup>(1)</sup> <sup>(3)</sup> H <sup>(2)</sup>	2	G	2
Through interior walls and slabs not covered by the above applications	G	4	G <sup>(1)</sup> <sup>(3)</sup> H <sup>(2)</sup>	4 4	G <sup>(1)</sup> <sup>(3)</sup> H <sup>(2)</sup>	4 4
Grating openings and penetrations	J	8	J	8	J	8

(1) Multiple piping 3 IN and smaller or multiple conduits.

(2) Single pipe 3 IN and smaller or single conduit.

(3) Single pipe or conduit larger than 3 IN.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 01 74 00 CLEANING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Requirements for keeping the Site free of accumulations of waste materials during construction ("progress cleaning").
  - 2. Cleaning for Substantial Completion and prior to final inspection (collectively, "closeout cleaning").
- B. Scope:
  - 1. Contractor shall perform cleaning during the Project, including progress cleaning, as condition precedent to Substantial Completion, upon completion of the Work, and as required by the General Conditions, as may be modified by the Supplementary Conditions, this Specifications section, and elsewhere in the Contract Documents.
  - 2. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Fire Protection Association (NFPA):
    - a. 241, Safeguarding Construction, Alteration, and Demolition Operations.

### **PART 2 - PRODUCTS - (NOT USED)**

### **PART 3 - EXECUTION**

#### **3.1 PROGRESS CLEANING**

- A. Progress Cleaning – General:
  - 1. Clean the Site, work areas, and other areas occupied by Contractor not less than weekly. Dispose of waste materials in accordance with the General Conditions, as may be modified by the Supplementary Conditions, and the following:
    - a. Comply with NFPA 241 for removing combustible waste materials and debris.
    - b. Do not hold non-combustible materials at the Site more than three days if the ambient air temperature is expected to rise above 80 DEGF. When ambient air temperature is less than 80 DEGF, dispose of non-combustible materials within seven days of their generation.
    - c. Provide suitable containers for storage of waste materials and debris. Avoid generation of odors and creation of nuisances.
    - d. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.
- B. Progress Cleaning – Site:
  - 1. Keep outdoor, dust-generating areas wetted down or otherwise control dust emissions.
  - 2. Not less than weekly, brush-sweep roadways and paved areas at the Site and adjacent areas used by construction vehicles or otherwise affected by construction activities.
  - 3. Comply with dust control requirements of Section 01 35 05 - Environmental Protection and Special Controls.
- C. Progress Cleaning – Work Areas:
  - 1. Clean areas where the Work is in progress to maintain an extent of cleanliness necessary for proper execution of the Work and safety of personnel.

2. Remove liquid spills promptly. Where spills may have harmful effects on health, safety, protection of facilities, or the environment, immediately report spills to Owner, Engineer, and authorities having jurisdiction, in accordance with the Contract Documents and Laws and Regulations.
  3. Where dust would impair proper execution of or quality of the Work, broom-clean or vacuum entire work area, as necessary.
  4. Concealed Spaces: Remove waste material and debris from concealed spaces before enclosing the space.
- D. Progress Cleaning – Installed Work:
1. Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of installed materials and equipment, using only cleaning agents and methods specifically recommended by material or equipment Supplier.
  2. If Supplier does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and property and that will not damage or mar exposed surfaces.
- E. Progress Cleaning – Exposed Surfaces:
1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.
- F. Progress Cleaning – Cutting and Patching:
1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, trailings and cuttings, and similar materials.
  2. Comply with Section 01 73 29 - Cutting and Patching, regarding cleaning during and after cutting and patching Work.
  3. Thoroughly clean piping, ductwork, conduits, and similar features before applying patching material, paint, or other finishing materials.
  4. Restore damaged insulation and coverings on piping, cutwork, and similar items to its pre-construction condition.
- G. Cleaning of Hydraulic Structures:
1. Clean hydraulic structures that will contain fluid, such as tanks and channels, in accordance with this Specifications section and Section 01 45 25 - Testing Concrete Structures.
  2. Do not perform field quality control activities such as testing tanks, channels, and other hydraulic structures for leakage or disinfecting (where applicable), and do not apply for inspection for Substantial Completion for hydraulic structures, until the associated hydraulic structures are clean and free of all waste materials, and ready for intended use.
- H. Waste Disposal:
1. Properly dispose of waste materials (including surplus materials, debris, rubbish, and other waste) off the Site.
  2. Do not burn or bury waste materials at the Site.
  3. Remove waste material and rubbish from excavations before backfilling.
  4. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into storm sewers, gutters, sanitary sewers, or other location in the environment. Dispose of such materials in accordance with Laws and Regulations.
  5. Do not discharge wastes to surface waters, drainage routes, or groundwater.
  6. Contractor is solely responsible for complying with Laws and Regulations regarding storing, transporting, and disposing of waste generated by Contractor's operations or brought to the Site by Contractor.
- I. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply protective covering where necessary or required for protection from damage or deterioration, until Substantial Completion.
- J. Clean completed construction as frequently as necessary throughout the construction period.

### 3.2 CLOSEOUT CLEANING

- A. Complete the following prior to requesting inspection for Substantial Completion:
1. Clean and remove from the Site waste material (including rubbish and debris) and other foreign and undesirable items and substances.
  2. Sweep broom-clean paved areas suitable for access by vehicles.
  3. Remove spills and stains or petroleum, oils, solvents, other chemicals, and other foreign and undesirable deposits.
  4. Hose-clean sidewalks and loading areas.
  5. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
  6. Surface waterways and drainage routes (including storm sewers, gutters, and ditches) shall be open and clean.
  7. Repair pavement, roads, sod, and other areas affected by construction operations and restore to specified condition; if condition is not specified, restore to preconstruction condition.
  8. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign and undesirable substances.
  9. Clean, wax, and polish wood, vinyl, and painted floors.
  10. Remove waste material and surface dust from limited-access spaces, including roofs, plenums, shafts, trenchway, equipment vaults, manholes, and similar spaces.
  11. In unoccupied spaces, sweep concrete floors broom-clean.
  12. Clean transparent materials, including mirrors and glazing in doors and windows. Remove glazing compounds and other noticeable, vision-obscurating materials. Replace chipped or broken glass and other damaged transparent materials.
  13. Remove non-permanent tags and labels.
  14. Surface Finishes:
    - a. Touch-up and otherwise repair and restore chipped, scratched, dented or otherwise marred surfaces to specified finish and match adjacent surfaces.
    - b. Do not paint over "UL" or similar labels, including mechanical and electrical nameplates.
  15. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign or undesirable substances.
  16. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
  17. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  18. Clean lighting fixtures, lamps, globes, and reflectors to function with full efficiency. Replace temporary lamps provided in permanent fixtures. Replace existing lighting fixture components that are burned out or noticeably dimmed from use during construction. Replace defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
  19. Leave the Site clean, and in neat, orderly condition, satisfactory to Owner and Engineer.
- B. Complete the following prior to requesting final inspection:
1. After Substantial Completion of all the Work, following completion of items of incomplete or damaged Work ("punch list Work"), clean "punch list Work areas in accordance with Paragraph 3.2.A of this Specifications Section.
  2. Remove field offices, Contractor's storage sheds, and remaining stockpiles and clean all such areas in accordance with Paragraph 3.2.B of this Specifications Section, and in accordance with Contract Documents for landscaping and restoration.

### END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK.



## **SECTION 01 81 10 WIND AND SEISMIC DESIGN CRITERIA**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section is intended to be used for all aspects of this project. When there are conflicts between this Section and other wind and seismic design criteria given in the Contract Documents, the more stringent loading shall control unless clarified in writing during the Bid phase. Obtain clarification of all conflicts in writing prior to construction.
- B. Section Includes:
  - 1. The wind and seismic design criteria for this project including all items directly specified in the Contract Documents as well as all items that are specified to be designed by the Contractor and submitted for approval. Items include but are not necessarily limited to the following:
    - a. Anchorage of mechanical and electrical equipment.
    - b. Anchorage of pipe support structures.
- C. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 03 15 19 - Anchorage to Concrete.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Society of Civil Engineers (ASCE):
    - a. 7-16, Minimum Design Loads for Buildings and Other Structures.
  - 2. Florida Building Code, 2020 Edition including all amendments, referred to herein as Building Code.
  - 3. When referenced standards conflict the most stringent shall apply unless specifically indicated otherwise in the Contract Documents or unless approved otherwise in writing by the Engineer.
- B. Qualifications:
  - 1. Engineer for Contractor designed items: Professional Engineer licensed in the State of Florida.

#### **1.3 GENERAL DESIGN CRITERIA**

- A. This paragraph is applicable to both wind and seismic design criteria.
- B. Design in accordance with the requirements of the Building Code and all applicable referenced standards.
- C. Risk Category: IV.
- D. Design in accordance with the Building Code load combinations for service level or factored level at Contractor's option.
  - 1. Mechanical and electrical equipment loads will be considered dead loads.

#### **1.4 SEISMIC DESIGN CRITERIA**

- A. Seismic Design Load Criteria:
  - 1. Design spectral acceleration at short period:  $S_{DS} = 0.046$ .
  - 2. Design spectral acceleration at 1-second period:  $S_{D1} = 0.035$ .
  - 3. Importance Factor:  $I_e = 1.5$ .
  - 4. Seismic Design Category: A.

5. Component or system amplification factor, ( $a_p$ ) and Component response modification factor, ( $R_p$ ): In accordance with ASCE 7-16, Tables\_13.5-1 and 13.6-1.
  6. Component importance factor:
    - a. All other components:  $I_p = 1.00$ .
- B. Seismic forces must be resisted by direct load transfer through fasteners to all seismic resisting elements. Do not use connections that use friction to transfer seismic forces.

### 1.5 WIND DESIGN CRITERIA

- A. Wind design load criteria:
1. Basic wind speed: 185 MPH.
  2. Exposure category: C.
  3. Topographic factor:  $K_{zt} = 1.0$ .
  4. Wind importance factor:  $I_w = \text{Not Applicable}$ .
  5. Building Description for wind design is Enclosed.
- B. Wind forces must be resisted by direct load transfer through fasteners to wind resisting elements. Do not use connections that use friction to transfer wind forces.

### 1.6 SUBMITTALS

- A. Informational Submittals:
1. Structural Calculations:
    - a. Submit calculations for each Contractor designed item under the Specification Section number for that item.
    - b. Indicate compliance with specific referenced documents of the Building Code.
    - c. Provide basis of design and lateral analysis as required to derive all loads and to show system stability including compatibility of deflections and compatibility with allowable soil parameters as applicable.
    - d. Indicate design load to each connection.
    - e. Provide a complete lateral load resisting system that transfers all wind and seismic loads through a load path to ground.
    - f. Sealed by a professional engineer licensed in the State the project is located in.

### PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

### PART 3 - EXECUTION - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

**END OF SECTION**



# DIVISION 03

## CONCRETE

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 03 09 00 CONCRETE**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Cast-in-place concrete and grout.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 03 15 19 - Anchorage to Concrete.
  - 4. Section 07 26 00 - Under Slab Vapor Retarder.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Concrete Institute (ACI):
    - a. 117, Specification for Tolerances for Concrete Construction and Materials.
    - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
    - c. 212.3R, Chemical Admixtures for Concrete.
    - d. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
    - e. 304.2R, Placing Concrete by Pumping Methods.
    - f. 305.1, Hot Weather Concreting.
    - g. 306.1, Cold Weather Concreting.
    - h. 318, Building Code Requirements for Structural Concrete.
    - i. 347, Guide to Formwork for Concrete.
    - j. CT-13, Concrete Terminology.
  - 2. ASTM International (ASTM):
    - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
    - b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
    - c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
    - d. A1064, Standard Specification for Steel Wire and Welded Wire Replacement, Plain and Deformed, for Concrete.
    - e. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
    - f. C33, Standard Specification for Concrete Aggregates.
    - g. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
    - h. C94/C94M, Standard Specification for Ready-Mixed Concrete.
    - i. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
    - j. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
    - k. C150, Standard Specification for Portland Cement.
    - l. C172, Standard Practice for Sampling Freshly Mixed Concrete.
    - m. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
    - n. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
    - o. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
    - p. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
    - q. C494, Standard Specification for Chemical Admixtures for Concrete.

- r. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- s. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
- t. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- u. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheet.
- v. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- w. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
- x. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
- y. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- z. E96, Standard Test Methods for Water Vapor Transmission of Materials.
- aa. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
- 3. Corps of Engineers (COE):
  - a. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
- 4. National Ready Mixed Concrete Association (NRMCA).
- 5. National Sanitation Foundation (NSF):
  - a. 61, Drinking Water System Components - Health Effects.
- B. Quality Control:
  - 1. Concrete testing agency:
    - a. Contractor to employ and pay for services of a testing laboratory to:
      - 1) Perform materials evaluation.
      - 2) Design concrete mixes.
    - b. Concrete testing agency to meet requirements of ASTM E329.
  - 2. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.
    - a. Approval of concrete mix design by Engineer does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.
  - 3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
    - a. Do not use revised concrete mixes until submitted to and approved by Engineer.
  - 4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
- C. Qualifications:
  - 1. Ready mixed concrete batch plant certified by NRMCA.
  - 2. Formwork, shoring and reshoring for slabs and beams except where cast on ground to be designed by a professional engineer currently registered in the state where the Project is located.

### 1.3 DEFINITIONS

- A. Per ACI CT-13 except as modified herein:
  - 1. Concrete fill: Non-structural concrete.
  - 2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
  - 3. Exposed concrete: Exposed to view after construction is complete.
  - 4. Indicated: Indicated by Contract Documents.
  - 5. Nonexposed concrete: Not exposed to view after construction is complete.
  - 6. Required: Required by Contract Documents.

7. Specified strength: Specified compressive strength at 28 days.
8. Submitted: Submitted to Engineer.

#### 1.4 SUBMITTALS

- A. Shop Drawings:
  1. Concrete mix designs proposed for use.
    - a. Concrete mix design submittal to include the following information:
      - 1) Sieve analysis and source of fine and coarse aggregates.
      - 2) Test for aggregate organic impurities.
      - 3) Test for deleterious aggregate per ASTM C1293.
      - 4) Proportioning of all materials.
      - 5) Type of cement with mill certificate for cement.
      - 6) Type of fly ash with certificate of conformance to specification requirements.
      - 7) Slump.
      - 8) Air content.
      - 9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
      - 10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
  2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Manufacturers and types:
      - 1) Joint fillers.
      - 2) Curing agents.
      - 3) Chemical sealer.
      - 4) Bonding and patching mortar.
      - 5) Construction joint bonding adhesive.
      - 6) Nonshrink grout with cure/seal compound.
  3. Reinforcing steel:
    - a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.
    - b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.
    - c. Obtain approval of Shop Drawings by Engineer before fabrication.
    - d. Mill certificates.
  4. Scaled (minimum 1/8 IN per foot) drawings showing proposed locations of construction joints, control joints, expansion joints (as applicable) and joint dimensions.
  5. Strength test results of in place concrete including slump, air content and concrete temperature.
  6. Certifications:
    - a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.
    - b. Certification that the material and sources submitted in the mix design will be used in the concrete for this project.
  7. Test reports:
    - a. Cement mill reports for all cement to be supplied.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage of Material:
  1. Cement and pozzolan:
    - a. Store in moistureproof, weathertight enclosures.
    - b. Do not use if caked or lumpy.
  2. Aggregate:
    - a. Store to prevent segregation and contamination with other sizes or foreign materials.
    - b. Obtain samples for testing from aggregates at point of batching.
    - c. Do not use frozen or partially frozen aggregates.

- d. Do not use bottom 6 IN of stockpiles in contact with ground.
    - e. Allow sand to drain until moisture content is uniform prior to use.
  - 3. Admixtures:
    - a. Protect from contamination, evaporation, freezing, or damage.
    - b. Maintain within temperature range recommended by manufacturer.
    - c. Completely mix solutions and suspensions prior to use.
  - 4. Reinforcing steel: Support and store all rebars above ground.
- B. Delivery:
- 1. Concrete:
    - a. Prepare a delivery ticket for each load for ready-mixed concrete.
    - b. Truck operator shall hand ticket to Owner's Representative at the time of delivery.
    - c. Ticket to show:
      - 1) Mix identification mark.
      - 2) Quantity delivered.
      - 3) Amount of each material in batch.
      - 4) Outdoor temp in the shade.
      - 5) Time at which cement was added.
      - 6) Numerical sequence of the delivery.
      - 7) Amount of water added.
  - 2. Reinforcing steel:
    - a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.
    - b. Mark numbers to match Shop Drawing mark number.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
- 1. Nonshrink, nonmetallic grout:
    - a. Sika "SikaGrout 212."
    - b. Euclid Chemical "NS Grout."
    - c. BASF Admixtures, Inc. "Masterflow 713."
  - 2. Expansion joint fillers:
    - a. Permaglaze Co.
    - b. Rubatex Corp.
    - c. Williams Products, Inc.
  - 3. Form coating:
    - a. Richmond "Rich Cote."
    - b. Industrial Lubricants "Nox-Crete Form Coating."
    - c. Euclid Chemical "Kurez DR VOX."
  - 4. Cementitious concrete coating:
    - a. BASF Building Systems.
    - b. Euclid Chemical Company.
  - 5. Chemical sealer:
    - a. L&M Construction Chemicals, Inc.
    - b. Euclid Chemical Company.
    - c. Dayton Superior.

### 2.2 MATERIALS

- A. Portland Cement: Conform to ASTM C150 Type I/II.
- B. Fly Ash:
- 1. ASTM C618, Class F or Class C.
  - 2. Nonstaining.
    - a. Hardened concrete containing fly ash to be uniform light gray color.



3. Maximum loss on ignition: 6 PCT.
  4. Compatible with other concrete ingredients.
  5. Obtain proposed fly ash from a source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.
- C. Admixtures:
1. Air entraining admixtures: ASTM C260.
  2. Water reducing, retarding, and accelerating admixtures:
    - a. ASTM C494 Type A through E.
    - b. Conform to provisions of ACI 212.3R.
    - c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Engineer and at no cost to Owner.
    - d. Follow manufacturer's instructions.
    - e. Use chloride free admixtures only.
  3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:
    - a. 0.10 all concrete.
  4. Do not use calcium chloride.
  5. Pozzolanic admixtures: ASTM C618.
  6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
- D. Water: Potable, clean, free of oils, acids and organic matter.
- E. Aggregates:
1. Normal weight concrete: ASTM C33, except as modified below.
  2. Fine aggregate:
    - a. Clean natural sand.
    - b. No manufactured or artificial sand.
  3. Coarse aggregate:
    - a. Crushed rock, natural gravel, or other inert granular material.
    - b. Maximum amount of clay or shale particles: 1 PCT.
  4. Gradation of coarse aggregate:
    - a. Lean concrete and concrete topping: Size #7.
    - b. All other concrete: Size #57 or #67.
- F. Concrete Grout:
1. Nonshrink, nonmetallic grout:
    - a. Nonmetallic, noncorrosive, nonstaining, premixed with only water to be added.
    - b. Grout to produce a positive but controlled expansion.
    - c. Mass expansion not to be created by gas liberation.
    - d. Minimum compressive strength of nonshrink grout at 28 days: 6500 PSI.
    - e. In accordance with COE CRD-C621.
  2. Epoxy grout:
    - a. 3-component epoxy resin system.
      - 1) Two liquid epoxy components.
      - 2) One inert aggregate filler component.
    - b. Each component packaged separately for mixing at jobsite.
- G. Reinforcing Steel:
1. Reinforcing bars: ASTM A615, Grade 60.
  2. Welded wire reinforcement:
    - a. ASTM A185 or ASTM A1064.
    - b. Minimum yield strength: 60,000 PSI.
  3. Column spirals: ASTM A82 or ASTM A1064.
- H. Forms:
1. Prefabricated or job built.

2. Wood forms:
    - a. 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.
    - b. Built-in-place or prefabricated type panel.
  3. Metal forms:
    - a. Metal forms may be used except for aluminum in contact with concrete.
    - b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.
  4. Chamfer strips: Clear white pine, surface against concrete planed.
- I. Form Ties:
1. Commercially fabricated for use in form construction.
    - a. Field fabricated ties are unacceptable.
  2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.
  3. 3/4 IN minimum to 1 IN maximum diameter cones on both ends.
  4. Embedded portion of ties to be not less than 1-1/2 IN from face of concrete after ends have been removed.
  5. Cone size:
    - a. 3/4 IN minimum diameter cones on both ends.
    - b. Depth of cone not to exceed the concrete reinforcing cover.
  6. Form release: Nonstaining and shall not prevent bonding of future finishes to concrete surface.
- J. Chairs, Runners, Bolsters, Spacers, and Hangers:
1. Stainless steel, epoxy coated, or plastic coated metal.
    - a. Plastic coated: Rebar support tips in contact with the forms only.
- K. Chemical Floor Sealer:
1. Colorless low VOC water-based solution containing acrylic copolymers.
    - a. ASTM C1315, Class B, minimum 30 PCT solids.
  2. L&M Construction Chemicals Inc. Dress & Seal WB 30.
- L. Cementitious Concrete Coating:
1. Polymer modified Portland cement based coating for concrete and masonry.
    - a. Waterproof.
    - b. Resistant to both positive and negative hydrostatic pressure.
    - c. Breathable.
  2. BASF "Masterseal 581 Thoroseal".
    - a. Color:
      - 1) Interior surfaces: Standard gray.
      - 2) Exterior surfaces: Custom color to match concrete surface.
      - 3) Texture: Fine.
- M. Membrane Curing Compound:
1. ASTM C309, Type 1D, Class A or B.
  2. Fugitive dye shall dissipate over time and exposure.
  3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.
- N. Expansion Joint Filler:
1. In contact with water or sewage:
    - a. Closed cell neoprene.
    - b. ASTM D1056, Class SC (oil resistant and medium swell) of 2 to 5 PSI compression deflection (Grade SCE41).
  2. Exterior driveways, curbs and sidewalks:
    - a. Asphalt expansion joint filler.
    - b. ASTM D994.
  3. Other use:
    - a. Fiber expansion joint filler.
    - b. ASTM D1751.

## 2.3 CONCRETE MIXES

### A. General:

1. All concrete to be ready mixed concrete conforming to ASTM C94/C94M.
2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight.
4. Provide pozzolan content for all cast-in-place construction.

### B. Strength:

1. Provide specified strength and type of concrete for each use in structure(s) as follows:

TYPE	WEIGHT	SPECIFIED STRENGTH*
Lean concrete	Normal weight	3000 PSI
All other general use concrete	Normal weight	4000 PSI

\* Minimum 28-day compressive strength.

### C. Slump - 4 IN maximum, 1 IN minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. 8 IN maximum after addition of superplasticizer (if used).
3. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
4. Pumped concrete:
  - a. Provide additional water at batch plant to allow for slump loss due to pumping.
  - b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified and the maximum specified water-cement ratio is not exceeded.
5. Slump may be adjusted in the field through the use of water reducers.
  - a. Coordinate dosage and mixing requirements with concrete supplier.
6. Determine slump per ASTM C143.

### D. Selection of Proportions:

1. General:
  - a. Proportion ingredients to:
    - 1) Produce proper workability, durability, strength, and other required properties.
    - 2) Prevent segregation and collection of excessive free water on surface.
2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

SPECIFIED STRENGTH	TARGET CEMENT, MAXIMUM AGGREGATE SIZE			MAXIMUM WATER CEMENT RATIO BY WEIGHT
	1/2 IN	3/4 IN	1 IN	
3000	---	517	517	0.45
4000	564	564	564	0.45

### 3. Fly ash:

- a. For cast-in-place concrete only, a maximum of 25 PCT by weight of Portland cement content per cubic yard may be replaced with fly ash at rate of 1 LB fly ash for 1 LB of cement.
- b. When fly ash is used, the water to cementitious materials ratio shall not exceed the maximum value specified herein.
4. Concrete mix proportioning methods for normal weight concrete:
  - a. Proportion mixture to provide desired characteristics using one of methods described below:

- 1) Method 1 (Trial Mix):
  - a) Per ACI 318, Chapter 26, except as modified herein.
  - b) Air content within range specified above.
  - c) Record and report temperature of trial mixes.
  - d) Proportion trial mixes per ACI 211.1.
- 2) Method 2 (Field Experience):
  - a) Per ACI 318, Chapter 26, except as modified herein:
  - b) Field test records must be acceptable to Engineer to use this method.
  - c) Test records shall represent materials, proportions and conditions similar to those specified.
5. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Chapter 26 of ACI 318 using the standard deviation of the proposed concrete production facility.

## **PART 3 - EXECUTION**

### **3.1 FORMING AND PLACING CONCRETE**

- A. Formwork:
  1. Contractor is responsible for design and erection of formwork.
  2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
    - a. Allowable tolerances: As recommended in ACI 347.
  3. Provide slabs and beams of minimum indicated depth when sloping foundation base slabs or elevated floor slabs to drains.
    - a. For slabs on grade, slope top of subgrade to provide floor slabs of minimum uniform indicated depth.
    - b. Do not place floor drains through beams.
  4. Openings:
    - a. Provide openings in formwork to accommodate work of other trades.
    - b. Accurately place and securely support items built into forms.
  5. Chamfer strips: Place 3/4 IN chamfer strips in forms to produce 3/4 IN wide beveled edges on permanently exposed corners of members.
  6. Clean and adjust forms prior to concrete placement.
  7. Tighten forms to prevent mortar leakage.
  8. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.
- B. Reinforcement:
  1. Position, support and secure reinforcement against displacement.
  2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.
  3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
  4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
  5. Extend reinforcement to within 2 IN of concrete perimeter edges.
    - a. If perimeter edge is earth formed, extend reinforcement to within 3 IN of the edge.
  6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
  7. Do not weld reinforcing bars.
  8. Welded wire reinforcement:
    - a. Install welded wire reinforcement in maximum practical sizes.
    - b. Splice sides and ends with a splice lap length measured between outermost cross wires of each fabric sheet not less than:
      - 1) One spacing of cross wires plus 2 IN.
      - 2) 1.5 x development length.
      - 3) 6 IN.
    - c. Development length: ACI 318 basic development length for the specified fabric yield strength.

## C. Construction, Expansion, and Contraction Joints:

1. Locate joints as indicated on Contract Drawings or as shown on approved Shop Drawings.
  - a. Where construction joint spacing shown on Drawings exceeds the joint spacing indicated in Paragraph below, submit proposed construction joint location in conformance with this Specification Section.
2. Unplanned construction joints will not be allowed.
3. Locate wall vertical construction joints at 50 FT maximum.
4. Locate construction joints in floor slabs and foundation base slabs so that concrete placements are approximately square and do not exceed 4000 SQFT.
5. Locate construction joints in columns and walls:
  - a. At the underside of beams, girders, haunches, drop panels, column capitals, and at floor panels.
  - b. Haunches, drop panels, and column capitals are considered part of the supported floor or roof and shall be placed monolithically therewith.
  - c. Column based need not be placed monolithically with the floor below.
6. Install construction joints perpendicular to main reinforcement with all reinforcement continued across construction joints.
7. At least 48 HRS shall elapse between placing of adjoining concrete construction.
8. Thoroughly clean and remove all laitance and loose and foreign particles from construction joints.
9. Before new concrete is placed, dampen concrete surfaces.

## D. Embedments:

1. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete.
2. See Specification Section 03 15 19 - Anchorage to Concrete.
3. Use setting diagrams, templates and instructions for locating and setting.

## E. Placing Concrete:

1. Place concrete in compliance with ACI 304R and ACI 304.2R.
2. Place in a continuous operation within planned joints or sections.
3. Begin placement when work of other trades affecting concrete is completed.
4. Place concrete by methods which prevent aggregate segregation.
5. Do not allow concrete to free fall more than 4 FT.
6. Where free fall of concrete will exceed 4 FT, place concrete by means of tremie pipe or chute.

## F. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.

## G. Protection:

1. Protect concrete from physical damage or reduced strength due to weather extremes.
2. In cold weather comply with ACI 306.1 except as modified herein.
  - a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.
  - b. Do not place heated concrete that is warmer than 80 DEGF.
  - c. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 DEGF for seven days or 70 DEGF for 3 days.
  - d. Do not allow concrete to cool suddenly.
3. In hot weather comply with ACI 305.1 except as modified herein.
  - a. At air temperature of 90 DEGF and above, keep concrete as cool as possible during placement and curing.
  - b. Do not allow concrete temperature to exceed 90 DEGF at placement.
  - c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
  - d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 LBS/SF/HR as determined from ACI 305.1, Figure 2.1.5.

**H. Curing:**

1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.
2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.
3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.
4. Provide curing for minimum of seven days.
5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.
6. In hot weather follow curing procedures outlined in ACI 305.1.
7. In cold weather follow curing procedures outlined in ACI 306.1.
8. Curing vertical surfaces with a curing compound:
  - a. Cover vertical surfaces with a minimum of two coats of the curing compound.
  - b. Allow the preceding coat to completely dry prior to applying the next coat.
  - c. Apply the first coat of curing compound immediately after form removal.
  - d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.
  - e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.

**I. Form Removal:**

1. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support.
2. Where no reshoring is planned, leave forms and shoring used to support concrete until it has reached its specified 28-day compressive strength.

**3.2 CONCRETE FINISHES****A. Tolerances:**

1. Class A: 1/8 IN in 10 FT.
2. Class B: 1/4 IN in 10 FT.

**B. Surfaces Exposed to View:**

1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:
  - a. To be covered with a coating or covering material applied directly to concrete.
  - b. Scheduled for grout cleaned finish.
2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.
3. Cementitious concrete coating:
  - a. Form facing material shall produce a smooth, hard, uniform texture.
    - 1) Use forms specified for surfaces exposed to view.
  - b. Prepare the surface in accordance with manufactures printed installation instructions.
  - c. Brush on coating to entire surface.
    - 1) As a mixing liquid for the coating, use bonding agent and water mixture as recommended by the manufacture.
    - 2) Apply two (2) coats at 2 LB/SQYD per coat.
  - d. When second coat is set, float to a uniform texture with a sponge coat.
  - e. Provide this finish at the following locations:
    - 1) Walls, columns, exposed to view.

**C. Surfaces Not Exposed to View:**

1. Patch voids, air pockets and honeycomb areas with cement grout.
2. Fill tie holes with nonshrink, nonmetallic grout.

**D. Slab Float Finish:**

1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
2. Do not use water to aid in finishing.
3. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.

4. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two different angles.
  5. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.
  6. Refloat slab immediately to a uniform sandy texture.
- E. Troweled Finish:
1. Float finish surface.
  2. Next power trowel, and finally hand trowel.
  3. Do not use water to aid in finishing.
  4. Produce a smooth surface which is relatively free of defects with first hand troweling.
  5. Perform additional trowelings by hand after surface has hardened sufficiently.
  6. Final trowel when a ringing sound is produced as trowel is moved over surface.
  7. Thoroughly consolidate surface by hand troweling.
  8. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
  9. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.
- F. Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.

### 3.3 GROUT

- A. Preparation:
1. Nonshrinking, nonmetallic grout:
    - a. Clean concrete surface to receive grout.
    - b. Saturate concrete with water for 24 HRS prior to grouting.
- B. Application:
1. Nonshrinking, nonmetallic grout:
    - a. Mix in a mechanical mixer.
    - b. Use no more water than necessary to produce flowable grout.
    - c. Place in accordance with manufacturer's instructions.
    - d. Completely fill all spaces and cavities below the bottom of baseplates.
    - e. Provide forms where baseplates and bedplates do not confine grout.
    - f. Where exposed to view, finish grout edges smooth.
    - g. Except where a slope is indicated on Drawings, finish edges flush at the baseplate, bedplate, member, or piece of equipment.
    - h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.
    - i. Wet cure grout for seven days, minimum.

### 3.4 FIELD QUALITY CONTROL

- A. Owner will employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.
1. Contractor to cooperate with Owner in obtaining and testing samples.
- B. Tests During Construction:
1. Strength test:
    - a. For each strength test, mold and cure cylinders from each sample in accordance with ASTM C31.
      - 1) Cylinder size: Per ASTM C31.
        - a) 4 IN cylinders may not be used for concrete mixes with concrete aggregate size larger than 1 IN.
      - 2) Quantity:
        - a) 6 IN DIA by 12 IN high: Four cylinders.
        - b) 4 IN DIA by 8 IN high: Six cylinders.
    - b. Field cure one (1) cylinder for the seven day test.
      - 1) Laboratory cure the remaining.

- c. Test cylinders in accordance with ASTM C39.
    - 1) 6 IN DIA cylinders:
      - a) Test two cylinders at 28 days for strength test result and the one field cured sample at seven days for information.
      - b) Hold remaining cylinder in reserve.
    - 2) 4 IN DIA cylinders:
      - a) Test three cylinders at 28 days for strength test result and the one field cured cylinder at seven days for information.
      - b) Hold remaining cylinders in reserve.
  - d. Strength test result:
    - 1) Average of strengths of two 6 IN DIA cylinders or three 4 IN DIA cylinders from the same sample tested at 28 days.
    - 2) If one cylinder in a test manifests evidence of improper sampling, molding, handling, curing, or testing, discard and test reserve cylinder(s); average strength of remaining cylinders shall be considered strength test result.
    - 3) Should all cylinders in any test show any of above defects, discard entire test.
  - e. Frequency of tests:
    - a) One strength test to be taken not less than once a day, nor less than once for each 60 CUYD or fraction thereof placed in any one day.
    - b) Once for each 5000 SQFT of slab or wall surface area placed each day.
    - c) If total volume of concrete on Project is such that frequency of testing required in above paragraph will provide less than five strength tests for each concrete mix, tests shall then be made from at least five randomly selected batches or from each batch if fewer than five batches are provided.
  - 2. Slump test:
    - a. Per ASTM C143.
    - b. Determined for each strength test sample.
    - c. Additional slump tests may be taken.
  - 3. Air content:
    - a. Per ASTM C231, ASTM C173, and ASTM C138.
    - b. Determined for each strength test sample.
  - 4. Temperature: Determined for each strength test sample.
- C. Evaluation of Tests:
- 1. Strength test results:
    - a. Average of 28-day strength of two cylinders from each sample.
      - 1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder will be test result.
      - 2) If both cylinders show any of above defects, test will be discarded.
- D. Acceptance of Concrete:
- 1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
    - a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.
    - b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 PSI.
  - 2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Engineer.
    - a. Perform additional tests and/or corrective measures at no additional cost to Owner.
- E. Concrete tolerances per ACI 117.

### 3.5 SCHEDULES

- A. Form Types:
  - 1. Surfaces exposed to view:
    - a. Prefabricated or job-built wood forms.



- b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.
    - c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.
    - d. Construct forms sufficiently tight to prevent leakage of mortar.
  - 2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.
  - 3. Other types of forms may be used:
    - a. For surfaces not restricted to plywood or lined forms.
    - b. As backing for form lining.
- B. Grout:
  - 1. Nonshrinking, nonmetallic grout: General use.
- C. Concrete:
  - 1. Lean concrete: Where indicated on Drawings.
  - 2. Normal weight concrete: All other locations.
  - 3. General use concrete: All other locations.
- D. Concrete Finishes:
  - 1. Slab finishes:
    - a. Use following finishes as applicable, unless otherwise indicated:
      - 1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill and waterproofing.
      - 2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.
      - 3) Broom finish: Sidewalks, docks, concrete stairs, and ramps.

## END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 03 15 19**

### **ANCHORAGE TO CONCRETE**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Requirements for all cast-in-place anchor bolts, anchor rods, reinforcing adhesive anchorage, and post-installed concrete anchors required for the Project but not specified elsewhere in the Contract Documents.
  - 2. Design of all concrete anchors not indicated on the Drawings including, but not limited to, installation of anchors into concrete for the following structural and nonstructural components:
    - a. Structural members and accessories.
    - b. Metal, wood, and plastic fabrications.
    - c. Architectural components.
    - d. Mechanical and electrical equipment and components.
    - e. Plumbing, piping, and HVAC work.
    - f. All other components requiring attachment to concrete.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 03 09 00 - Concrete.
  - 4. Section 09 91 10 - Architectural Painting.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Concrete Institute (ACI):
    - a. 318, Building Code Requirements for Structural Concrete and Commentary.
  - 2. American Concrete Institute/Concrete Reinforcing Steel Institute (ACI-CRSI):
    - a. Adhesive Anchor Installation Certification Program: Adhesive Anchor Installer.
  - 3. American Institute of Steel Construction (AISC):
    - a. 303, Code of Standard Practice for Steel Buildings and Bridges.
  - 4. ASTM International (ASTM):
    - a. A36, Standard Specification for Carbon Structural Steel.
    - b. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
    - c. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - d. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - e. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
    - f. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
    - g. A563, Standard Specification for Carbon and Alloy Steel Nuts.
    - h. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
    - i. F436, Standard Specification for Hardened Steel Washers.
    - j. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
    - k. F594, Standard Specification for Stainless Steel Nuts.
    - l. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
    - m. F2329, Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

5. ICC Evaluation Service (ICC-ES):
  - a. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
  - b. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.
6. Building code:
  - a. Florida Building Code and associated standards, 2017 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
  1. Anchor designer for Contractor-designed post-installed anchors and cast in place anchorage shall be a professional engineer licensed in the State that the Project is located in.
  2. Installer for post-installed anchors shall be trained by the manufacturer or certified by a training program approved by the Engineer.
- C. Post-installed anchors and related materials shall be listed by the following agencies:
  1. ICC-ES.
  2. Engineer approved equivalent.

### 1.3 DEFINITIONS

- A. Adhesive Anchors:
  1. Post-installed anchors developing their strength primarily from chemical bond between the concrete and the anchor.
  2. Includes anchors using acrylics, epoxy and other similar adhesives.
- B. Anchor Bolt: Any cast-in-place anchorage that is made of a headed (i.e. bolt) material.
- C. Anchor Rod: Any cast-in-place or post-installed anchorage made from unheaded, threaded, rod or deformed bar material.
- D. Concrete Anchor: Generic term for either an anchor bolt or an anchor rod.
- E. Galvanizing: Hot-dip galvanizing per ASTM A123, ASTM A153 or ASTM F2329 with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.
- F. Hardware: As defined in ASTM A153.
- G. Installer or Applicator:
  1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  2. Installer and applicator are synonymous.
- H. MPII: Manufacturer's printed installation instructions.
- I. Mechanical Anchors:
  1. Post-installed anchors developing their strength from attachment other than thru adhesives or chemical bond to concrete.
  2. Includes expansion anchors, expansion sleeve, screw anchors, undercut anchors, specialty inserts and other similar types of anchorages.
  3. Drop-in anchors and other similar anchors are not allowed.
- J. Post-Installed Anchor: Any adhesive or mechanical anchor installed into previously placed and adequately cured concrete.

### 1.4 SUBMITTALS

- A. Shop Drawings:
  1. Product technical data including:
    - a. Acknowledgement that submitted products meet requirements of referenced standards.
    - b. Manufacturer material data sheet for each anchor.
      - 1) Clearly indicate which products on the data sheet are proposed for use on the Project.

- c. Manufacturer's printed installation instructions.
  - d. Current ICC-ES report for each post-installed anchor system indicating the following:
    - 1) Certification that anchors meet all requirements indicated in this Specification.
    - 2) Performance data showing that anchor is approved for use in cracked concrete.
    - 3) Seismic design categories for which anchor system has been approved.
    - 4) Required installation procedures.
    - 5) Special inspection requirements for installation.
  - e. Anchorage layout drawings and details:
    - 1) Indicate anchor diameter, embedment, length, anchor type, material and finish.
    - 2) Drawings showing location, configuration, spacing and edge distance.
  - f. Contractor Designed Post-Installed Anchors:
    - 1) Show diameter and embedment depth of each anchor.
    - 2) Indicate compliance with ACI 318, Chapter 17.
    - 3) Design tension and shear loads used for anchor design.
    - 4) Engineering design calculations:
      - a) Indicate design load to each anchor.
      - b) When the design load is not indicated on Drawings, include calculations to develop anchor forces based on Design Criteria listed herein.
      - c) Sealed and signed by contractor's professional engineer.
      - d) Calculations will be submitted for information purposes only.
    - 5) Type of post-installed anchor system used.
      - a) Provide manufacturer's ICC-ES report for the following:
        - (1) Mechanical anchorage per ICC-ES AC193.
        - (2) Adhesive anchorage per ICC-ES AC308.
- B. Samples:
- 1. Representative samples of concrete anchors may be requested by Engineer. Review will be for type and finish only. Compliance with all other requirements is exclusively the responsibility of the Contractor.
- C. Informational Submittals:
- 1. Certification of qualifications for each installer of post-installed anchors.
    - a. Indicate successful completion or certification for each type of approved post-installed anchor as required by the Contract Documents.
    - b. Provide one of the following for each type of anchor, as required by this specification section:
      - 1) Letter from manufacturer documenting successful training completion
      - 2) Certification of completion for Engineer approved program.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to job site in manufacturer's or distributor's packaging undamaged and complete with installation instructions.
- B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.
- C. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage or deterioration.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cast-in-place Concrete Anchors:
  - 1. Building, nonbuilding structures, and equipment:
    - a. ASTM F1554, Grade 36 or Grade 55 with weldability supplement S1 for galvanized headed rods.
    - b. ASTM A307, Grade A for galvanized headed bolts.

2. All other cast-in-place concrete anchors:
  - a. Stainless steel with matching nut and washer.
  - b. Submerged application: ASTM F593, Type 316.
  - c. Non-submerged application: ASTM F593, Type 304 or Type 316.
- B. Post-Installed Mechanical and Adhesive Concrete Anchors:
  1. Stainless steel with matching nut and washer.
  2. Submerged application: ASTM F593, Type 316.
  3. Non-submerged application: ASTM F593, Type 304 or Type 316.
- C. Reinforcement: See Section 03 09 00.
- D. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 PSI and a minimum tensile strength of 60,000 PSI.
- E. Deformed Bar Anchors: ASTM A496 with minimum yield strength of 70,000 PSI and a minimum tensile strength of 80,000 PSI.
- F. Washers:
  1. ASTM F436 unless noted otherwise.
  2. If stainless steel anchorage is being used for cast-in-place anchorage, furnish washers of the same material and alloy as in the accompanying anchorage.
  3. Plate washers: Minimum 3/4 IN thick fabricated ASTM A36 square plates as required.
  4. Follow manufacturer's requirements for all post-installed anchorage.
- G. Nuts:
  1. ASTM A563 for all cast-in-place anchorage.
  2. If stainless steel anchorage is being used for cast-in-place anchorage, nuts shall meet ASTM F594 and be the matching material and alloy as in the accompanying anchorage.
  3. Follow manufacturer's requirements if using post-installed anchorage.
- H. Galvanizing Repair Paint:
  1. High zinc dust content paint for regalvanizing welds and abrasions.
  2. ASTM A780.
  3. Zinc content: Minimum 92 PCT in dry film.
  4. ZRC "ZRC Cold Galvanizing" or Clearco "High Performance Zinc Spray."
- I. Dissimilar Materials Protection: See Specification Section 09 96 00.

## 2.2 CONTRACTOR DESIGNED ANCHORAGE

- A. Manufacturers:
  1. Post-installed anchor systems for the listed manufacturers will be considered only if a current ICC-ES evaluation report is submitted in accordance with the SUBMITTALS Article in PART 1 of this Specification Section and if the anchor system is approved by the Engineer.
    - a. Hilti.
    - b. Dewalt.
    - c. Simpson Strong-Tie.
- B. Design the anchorage when any of the following occur:
  1. Design load for concrete anchorage is shown on the Drawings.
  2. When specifically required by the Contract Documents.
  3. When an anchorage is required but not specified in the Drawings.
  4. When anchorage is shown on Drawings other than Structural Drawings.
- C. Anchorage Design Loads:
  1. Determine all of the design loads, including wind and seismic loads, per the Building Code.
    - a. Anchorage of equipment and non-structural components: Use the actual dead and operating loads provided by the manufacturer.

- D. When Contract Drawings, other than the Structural Drawings, indicate an anchor diameter or length, the Contractor design shall incorporate these as “minimums.”
- E. Cast-in-Place Concrete Anchors:
  - 1. Provide the material, nominal diameter, embedment length, spacing, edge distance and design capacity to resist the calculated load based on the requirements given in the Building Code including ACI 318.
  - 2. Design assuming cracked concrete.
- F. Post-installed Concrete Anchors:
  - 1. Provide the manufacturer's system name/type, nominal diameter, embedment depth, spacing, minimum edge distance, cover, and design capacity to resist the specified or calculated load based on requirements given in the Building Code, ACI 318 and current ICC-ES report, for the anchor to be used.
  - 2. Design assuming cracked concrete.

### **2.3 ENGINEER DESIGNED ANCHORAGE**

- A. When the size, length and details of anchorages are shown on Contract Structural Drawings, Contractor design of anchorage is not required.
- B. Manufacturers:
  - 1. Additional newer post-installed anchor systems for the listed manufacturers will be considered only if a current evaluation agency report is submitted in accordance with the SUBMITTALS Article in PART 1 of this Specification Section, the anchor system is certified by ICC-ES for cracked concrete conditions, and if approved by the Engineer.
  - 2. Mechanical Anchors:
    - a. Hilti:
      - 1) Kwik Bolt TZ (ICC-ES ESR-1917).
  - 3. Adhesive Concrete Anchors:
    - a. Hilti:
      - 1) HIT RE 500 V3 (ICC ESR-3814).
  - 4. Concrete Screw Anchors:
    - a. Hilti:
      - 1) Kwik HUS-EZ Screw (ICC-ES ESR-3027).

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Cast-in-Place Anchorage:
  - 1. Use where anchor rods or bolts are indicated on the Drawings, unless another anchor type is approved by the Engineer.
  - 2. Provide concrete anchorage as shown on the Drawings or as required to secure components to concrete.
- B. Adhesive Anchorage:
  - 1. Use only where specifically indicated on the Drawings or when approved for use by the Engineer.
  - 2. May be used where subjected to vibration or where buried or submerged.
  - 3. Do not use in overhead applications or sustained tension loading conditions such as utility hangers.
  - 4. Contact Engineer for clarification when anchors will not be installed in compliance with manufacturer's printed installation requirements.
- C. Mechanical Anchorage:
  - 1. Use only where specifically indicated on the Drawings or when approved for use by the Engineer.
  - 2. Do not use where subjected to vibration.

3. May be used in overhead applications.
  4. Contact Engineer for clarification when anchors will not be installed in compliance with manufacturer's printed installation requirements.
- D. Do not use powder actuated fasteners and other types of bolts and fasteners not specified herein for structural applications unless approved by the Engineer or specified in Contract Documents.

### 3.2 PREPARATION

- A. Provide adequate time to allow for proper installation and inspection prior to placing concrete for cast-in-place concrete anchorage.
- B. Prior to installation, inspect and verify areas and conditions under which concrete anchorage is to be installed.
1. Notify Engineer of conditions detrimental to proper and timely completion of work.
  2. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.
- C. Special Inspection is required in accordance with the Building Code for all concrete anchorage.
1. Notify the Special Inspector that an inspection is required prior to concrete placement (or during post-installed anchorage installation).
  2. See the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section for additional requirements.
- D. Post-installed anchor manufacturer's representative shall demonstrate and observe the proper installation procedures for the post-installed anchors at no additional expense to the Owner.
1. Follow such procedures to assure acceptable installation.
  2. Adhesive anchors must be installed in concrete aged a minimum of 21 days

### 3.3 INSTALLATION

- A. Tie cast-in-place anchorage in position to embedded reinforcing steel using wire.
1. Tack welding of anchorage is prohibited.
  2. Coat the projected portion of carbon steel anchors and nut threads with a heavy coat of clean grease after concrete has cured.
  3. Anchorage location tolerance shall be in accordance with AISC 303.
  4. Provide steel or durable wood templates for all column and equipment anchorage.
    - a. Templates to be placed above top of concrete and not impede proper concrete placement and consolidation.
- B. Unless noted or specified otherwise:
1. Connect aluminum and steel members to concrete and masonry using stainless steel cast-in-place anchorage unless shown otherwise.
    - a. Provide dissimilar materials protection per Specification Section 09 91 10.
  2. Provide washers for all anchorage.
  3. Where exposed, extend threaded anchorage a minimum of 1/2 IN above the top of the fully engaged nut.
    - a. If anchorage is cut off to the required maximum height, threads must be dressed to allow nuts to be removed without damage to the nuts.
- C. Do the following after nuts are snug-tightened down:
1. If using post-installed anchorage, follow MPII.
  2. Upset threads of anchorage to prevent nuts from backing off.
    - a. Provide double nut or lock nut in lieu of upset threads for items that may require removal in the future.
  3. For all other cast-in-place anchorage material, tighten nuts down an additional 1/8 turn to prevent nuts from backing off.
  4. If two nuts are used per concrete anchor above the base plate, tighten the top nut an additional 1/8 turn to "lock" the two nuts together.
  5. If using post-installed anchorage, follow manufacturer's installation procedures.



- D. Assure that embedded items are protected from damage and are not filled in with concrete.
- E. Secure architectural components such that it will not be aesthetically distorted nor fasteners overstressed from expansion, contraction or installation.
- F. Coat aluminum surfaces in contact with dissimilar materials in accordance with Specification Section 09 91 10.
- G. Repair damaged galvanized surfaces in accordance with ASTM A780.
  - 1. Prepare damaged surfaces by abrasive blasting or power sanding.
  - 2. Apply galvanizing repair paint to minimum 6 mils DFT in accordance with manufacturer's instructions and ASTM A780.
- H. For post-installed anchors, comply with the MPlI on the hole diameter and depth required to fully develop the tensile strength of the anchor or reinforcing bar.
  - 1. Use hammer drills to create holes.
  - 2. Properly clean out the hole per the ICC-ES reports utilizing a non-metallic fiber bristle brush and compressed air or as otherwise required to remove all loose material from the hole prior to installing the anchor in the presence of the Special Inspector.

### **3.4 FIELD QUALITY CONTROL**

- A. Special Inspection:
  - 1. See Section 01 45 33.
  - 2. See Section 03 09 00.

### **3.5 CLEANING**

- A. After concrete has been placed, remove protection and clean all anchorage of all concrete, dirt, and other foreign matter.
- B. Provide surface acceptable to receive field applied paint coatings when specified in Specification Section 09 91 10.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.



# DIVISION 04

## MASONRY

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 04 01 20 MASONRY CLEANING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Masonry cleaning.
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 04 22 00 - Concrete Masonry.

#### **1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Use experienced workmen familiar with product and its application.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Manufacturer's application instructions.
    - b. Manufacturer's dilution recommendations.
    - c. Manufacturer's recommendations on neutralizing rinse.
- B. Certifications:
  - 1. Certification that Contractor is experienced in this type of masonry cleaning.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Cleaning solution, detergent type:
    - a. PROSOCO, Inc.
    - b. Diedrich Technologies, Inc.
  - 2. Cleaning solution for manganese or vanadium stained masonry:
    - a. PROSOCO, Inc.
    - b. Diedrich Technologies, Inc.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

#### **2.2 MATERIALS**

- A. Detergent-Type Cleaning Solution: PROSOCO, Inc. "Sure Klean #600 IN detergent masonry cleaner.
- B. Manganese or Vanadium-Stained Masonry: PROSOCO, Inc. "Vanatrol."
- C. Water: Potable.
- D. Neutralizing rinse as required by manufacturer.

**2.3 MIXES**

- A. Dilute cleaning solution with potable water at rate which will provide for the weakest solution allowable for cleaning wall.
- B. If project conditions require solution of greater than 5 PCT acid, obtain permission from Engineer in writing prior to applying solution to wall surface.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Allow 28 days after completion of masonry work before start of cleaning.
- B. Remove excess mortar using wooden paddles and scrapers.
- C. Protect adjacent surfaces not to be cleaned.

**3.2 APPLICATION**

- A. Protect adjacent surfaces subject to potential damage by cleaning solution.
- B. Apply masonry cleaner to exposed-to-view masonry surfaces.
  - 1. Do not use wire brushes.
  - 2. Use only tools free of rust.
  - 3. Apply solution using fibered wall-washing brush.
- C. Thoroughly rinse and pre-soak walls.
- D. Flush all loose mortar and dirt from surface.
- E. Wet to prevent "run-off" streaking.
- F. Scrape off mortar and reapply cleaning solution.
- G. After scrubbing, clean thoroughly with pressurized water.
- H. Apply neutralizing rinse as recommended by manufacturer.

**END OF SECTION**

**SECTION 04 05 13**  
**MASONRY MORTAR AND GROUT**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Masonry mortar.
  - 2. Masonry grout.
  - 3. Integral water repellent admixture.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 04 22 00 - Concrete Masonry.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. C143/C143M, Standard Test Method for Slump of Hydraulic-Cement Concrete.
    - b. C144, Standard Specification for Aggregate for Masonry Mortar.
    - c. C150/C150M, Standard Specification for Portland Cement.
    - d. C207, Standard Specification for Hydrated Lime for Masonry Purposes.
    - e. C270, Standard Specification for Mortar for Unit Masonry.
    - f. C404, Standard Specification for Aggregates for Masonry Grout.
    - g. C476, Standard Specification for Grout for Masonry.
    - h. C1019, Standard Test Method for Sampling and Testing Grout.
    - i. C1093, Standard Practice for Accreditation of Testing Agencies for Masonry.
    - j. C1384, Standard Specification for Admixtures for Masonry Mortars.
  - 2. Masonry Standards Joint Committee (MSJC):
    - a. Specification for Masonry Structures (ACI 530.1/ASCE 6/TMS 602); referred to herein as MSJC Specification.
  - 3. Building code: Latest Building Code
- B. Qualifications:
  - 1. Preconstruction Testing Laboratory shall be an independent agency qualified in accordance with ASTM C1093 for performing the testing indicated.
    - a. Testing Laboratory shall have a minimum of 10 years experience in the testing of mortar and grout.
    - b. Technician conducting tests shall have minimum of five years experience in the testing of mortar and grout.

**1.3 DEFINITIONS**

- A. Coarse grout and fine grout are defined by the aggregate size used in accordance with ASTM C476.
- B. Coarse aggregate and fine aggregate are defined in ASTM C404, Table 1.

**1.4 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. General:

- 1) Product data for cementitious materials.
    - 2) Source or producer of aggregates and gradation.
    - 3) Integral water repellent manufacturer's dosage rate.
  - c. Proposed mortar mix design:
  - d. Proposed masonry grout mix design.
3. Test results:
  - a. Preconstruction mortar test results.
  - b. Preconstruction masonry grout test results.
- B. Informational Submittals:
  1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  2. Qualifications of testing lab and technician.
  3. Test results and inspection reports per Specification Section 01 45 33.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Store cementitious materials on elevated platforms, under cover, and in a dry location.
  1. Do not use cementitious materials that have become damp.
- B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- C. Deliver preblended, dry mixes in moisture-resistant containers.
  1. Store preblended, dry mixes in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Portland Cement:
  1. ASTM C150/C150M, Type I or II.
  2. No air entrainment.
  3. Natural color.
  4. Maximum percent of alkalis: 0.60 in accordance with ASTM C150/C150M, Table 2.
- B. Hydrated Lime:
  1. ASTM C207, Type S.
  2. Type SA not acceptable.
  3. Lime substitutes are not acceptable.
- C. Mortar Aggregate: ASTM C144, free of gypsum.
- D. Grout Aggregate: ASTM C404.
- E. Water: Potable.
- F. Integral Water Repellent Admixture:
  1. Liquid polymeric admixture: ASTM C1384.
  2. Verify compatibility with liquid water repellent admixture being used in the fabrication of concrete masonry units.

### **2.2 MIXES**

- A. Mortar and grout shall comply with MSJC Specification and Building Code.
- B. Type "S" mortar shall be used:
  1. Comply with ASTM C270, Table No. 1, Cement-Lime Mortar.
    - a. Do not use masonry cement or mortar cement.
    - b. No fly ash additives will be accepted.
  2. Mix materials minimum of three minutes and maximum of five minutes.



3. Adjust consistency to satisfaction of mason.
  4. Do not use admixtures unless otherwise indicated.
  5. Provide integral water repellent admixture in mortar used for:
    - a. Exterior concrete masonry work.
    - b. Interior concrete masonry work in wet areas.
  6. Do not use integral water repellent admixture in mortar for brick.
- C. Masonry Grout:
1. ASTM C476.
    - a. Minimum 28-day compressive strength: 2,000 PSI.
    - b. Slump: 8 to 11 IN.
  2. Mix 5 minutes minimum.
  3. No admixtures allowed.
  4. At Contractor's option, premixed or preblended grout meeting the above minimum requirements may be used.

### 2.3 SOURCE QUALITY CONTROL

- A. Perform preconstruction laboratory tests on proposed masonry mortar and grout prior to start of masonry work.
1. Perform tests far enough in advance so that any necessary retesting can be accomplished before masonry construction begins.
    - a. Test mortar per ASTM C270.
    - b. Test grout per ASTM C1019.
- B. Source Limitations for Mortar Materials:
1. Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and MSJC Specification.
- B. Mortar:
1. If standard gray mortar begins to stiffen, it may be retempered by adding water and remixing unless prohibited by water repellent admixture manufacturer.
    - a. Standard gray mortar shall not be retempered more than one time.
  2. All mortar must be used within 2-1/2 HRS maximum after initial mixing per MSJC Specification.
  3. Engineer reserves right to alter mix design based on initial rate of absorption of masonry units.
  4. Set masonry using type S mortar.
    - a. Rake mortar from joint as recommended by the unit manufacturer.
    - b. Tuckpoint raked joints and scored joints using pointing grout.
      - 1) Install pointing grout in accordance with ANSI A108.10 and masonry unit manufacturer's published instructions.
      - 2) Use polymer modified sanded pointing grout for joints in:
        - a) Exterior masonry.
        - b) Interior dry areas.
      - 3) Use epoxy pointing grout for joints in interior areas subject to exposure to corrosive or caustic chemicals.
- C. Masonry Grout:
1. Use grout within 1-1/2 HRS maximum after initial mixing.
  2. Use no grout after it has begun to set.
  3. Do not retemper grout after initial mixing.

4. Place grout in lifts not exceeding 4 FT.
5. Use coarse grout in spaces with least dimension over 2 IN.
6. Consolidate all grout while installing.
  - a. Consolidate grout pours 12 IN or less in height by mechanical vibration or by puddling.
  - b. Consolidate grout pours exceeding 12 IN in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

### **3.2 FIELD QUALITY CONTROL**

- A. Masonry Mortar and Grout Testing and Inspection:
  1. Testing and inspection services will be provided by the Owner's special masonry inspector.
    - a. Do not include in the bid price the cost of these services.
  2. Testing and inspection shall include, but is not limited to:
    - a. Observe proportions of site-prepared mortar and grout.
    - b. Observe grout space prior to grouting.
    - c. Grout compressive strength sampling, testing and reporting per ASTM C1019.
      - 1) One strength test shall be the average of three specimens from the same sample, tested at 28 days.
    - d. Grout slump test sampling, testing, and reporting per ASTM C143/C143M.
    - e. Frequency of sampling: One sample (three specimens) collected each grouting operation during masonry construction.
  3. Reporting: Special inspector to submit test results and inspection reports per Specification Section 01 45 33.

### **END OF SECTION**

## **SECTION 04 05 23 MASONRY ACCESSORIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Masonry accessories.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 04 22 00 - Concrete Masonry.
  - 4. Section 05 50 00 - Metal Fabrications.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
    - b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - c. A951, Standard Specification for Steel Wire for Masonry Joint Reinforcement.
    - d. A1008, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
    - e. D412, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
    - f. D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
    - g. D2000, Standard Classification System for Rubber Products in Automotive Applications.
    - h. D2240, Standard Test Method for Rubber Property—Durometer Hardness.
  - 2. Building code:
    - a. Florida Building Code, 2020 Edition including all amendments, referred to herein as Building Code.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Tear resistance of flashing material.
    - d. Manufacturer's recommendations for flashing adhesive.
    - e. Manufacturer's data sheet on each product.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Reglets:
    - a. Hohmann & Barnard, Inc.

- b. W. P. Hickman Co.
    - c. Superior Concrete Accessories, Inc.
  - 2. Masonry horizontal joint reinforcing and miscellaneous anchors:
    - a. Heckman.
    - b. Hohmann & Barnard, Inc.
    - c. Wire Bond.
  - 3. Thru wall flashing:
    - a. EPDM:
      - 1) Carlisle Syntech Systems, Inc.
      - 2) Firestone Building Products Co.
    - b. Stainless steel:
      - 1) Heckman Building Products.
      - 2) Hohmann & Barnard, Inc.
  - 4. Preformed control joint inserts:
    - a. Hohmann & Barnard, Inc.
    - b. Wire Bond.
  - 5. Grout screen:
    - a. Wire Bond.
    - b. Heckman Building Products.
    - c. Hohmann & Barnard, Inc.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

## 2.2 MANUFACTURED UNITS

- A. Thru Wall Flashing and Counterflashing:
  - 1. Stainless steel, ASTM A666, Type 316.
    - a. Finish: ASTM A480, 2D.
    - b. Minimum 26 GA,
  - 2. Maximum lengths of 10 FT.
  - 3. Factory fabricated.
  - 4. Factory fabricated one-piece inside and outside corners with a minimum return of 16 IN on each leg.
    - a. Weld all joints and grind smooth.
  - 5. Provide 1/2 IN drip on exterior side of wall.
  - 6. Refer to the Drawings for required profiles.
  - 7. Lap sealant: VULKEM 922.
- B. Thru Wall Flashing and Stainless Steel Drip:
  - 1. 40 MIL EPDM manufactured specifically for thru wall flashing.
    - a. Tear resistance: ASTM D624, 150 LB/IN minimum.
    - b. Width as necessary.
      - 1) Provide single piece full width, no horizontal joints will be allowed unless approved in writing by Engineer.
    - c. Factory precut wherever possible.
    - d. Factory fabricated inside corners, outside corners, and end dams.
  - 2. Stainless steel drip:
    - a. ASTM A666, Type 316.
    - b. Finish: ASTM A480, 2D.
    - c. Minimum 26 GA.
    - d. Maximum lengths of 10 FT.
      - 1) Extend horizontally the full depth of veneer.
    - e. Factory fabricated.
    - f. Factory fabricated inside and outside corners with a minimum return of 16 IN on each leg.
      - 1) Weld all joints and grind smooth.
    - g. Provide 1/2 IN drip leg on exterior side of wall.
    - h. Refer to the Drawings for profile.

- i. Lap sealant: VULKEM 922.
- C. Flashing Adhesive: As recommended by flashing manufacturer for sealing laps, sealing to vertical masonry and concrete surfaces and sealing to stainless steel surfaces.
- D. Reglets:
  - 1. Products specified are manufactured by Hohmann & Barnard, Inc.
  - 2. For masonry construction: Type #MR - Masonry Reglet.
  - 3. For concrete construction: Type #CR - Concrete Reglet.
- E. Horizontal Joint Reinforcing:
  - 1. General:
    - a. Conform to ASTM A951.
    - b. Cold drawn steel wire, ASTM A82.
    - c. 9 GA side rods.
    - d. 9 GA cross rods.
    - e. Hot-dipped galvanized, ASTM A153/A153M.
    - f. Prefabricated corner and tee sections with minimum length of 30 IN from point of intersection.
  - 2. Single wythe wall joint reinforcing: Ladder design.
  - 3. Composite wall joint reinforcing: Ladder design with double side rod.
  - 4. Cavity wall joint reinforcing with masonry back-up:
    - a. Ladder design horizontal joint reinforcing.
    - b. Wire eyes welded to horizontal joint reinforcing.
      - 1) Length as necessary to project through rigid insulation into airspace.
    - c. 3/16 IN DIA adjustable pintle veneer anchors.
      - 1) Length as necessary to provide minimum 2 IN embed into veneer mortar joint.
    - d. Hohmann & Barnard "270 Ladder."
- F. Preformed Rubber Control Joint Inserts:
  - 1. ASTM D2000, M2AA-805.
  - 2. Hardness: ASTM D2240, Shore A Durometer, 80 +/-5.
  - 3. Ultimate elongation: 350 PCT, ASTM D412.
  - 4. Tensile strength: 1000 PSI, ASTM D412.
  - 5. Hohmann & Barnard #RS Series.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Thru Wall Flashing and Stainless Steel Drip:
  - 1. Install to provide positive drainage of cavity moisture.
  - 2. Extend stainless steel drip beyond the exterior face of the wall to minimum distance possible while still allowing drip to perform intended purpose.
  - 3. Extend flashing horizontally beyond each edge of lintel or sills to next vertical mortar joint but not less than 4 IN and turn up edge one full veneer course.
    - a. Seal all joints.
  - 4. Where thru wall flashing [and stainless steel drip] steps up or down in the wall, provide end dam at step.
    - a. End dam shall extend up or down to tie into thru wall flashing step.
    - b. Seal all joints for continuous watertight barrier.
  - 5. Lap stainless steel drip minimum of 2 IN and bond two pieces together using stainless steel pop rivets and two beads of lap sealant.
  - 6. At concrete masonry unit back-up, install upper edge of flashing into block joint.
  - 7. At concrete back-up, secure upper edge of flashing into reglet and seal.
  - 8. Adhere vertical surface of flashing to back-up wall with adhesive recommended by flashing manufacturer.

9. Extend flashing minimum of 6 IN above top of weep joint mortar protection system.
  10. Lap and seal flashing at all inside and outside corners to provide continuous uninterrupted barrier.
- C. Butt joints of preformed control joint inserts tightly together and secure with adhesive or sealant acceptable to insert manufacturer.
- D. Reinforcing Masonry:
1. General:
    - a. Provide continuous horizontal joint reinforcing in all concrete masonry wall construction.
      - 1) Embed longitudinal side rods in mortar for entire length with minimum cover of 5/8 IN on exterior side of walls and 1/2 IN at other locations.
        - a) For interior partitions, the "exterior" side of the wall is considered the side having the most corrosive atmosphere or the corridor side of the wall.
      - 2) Lap reinforcement minimum of 12 IN at ends.
        - a) Remove cross wires on one side of the lap splice and bend the side rods slightly so the lap is provided with 12 IN of uninterrupted wire lap occurring in the same plane.
      - 3) Do not bridge control joints with horizontal joint reinforcing.
      - 4) Do not bridge expansion joints with horizontal joint reinforcing.
      - 5) At corners and wall intersections use prefabricated "L" and "T" horizontal joint reinforcing sections.
      - 6) Cut and bend as necessary.
    - b. Install reinforcing at 16 IN OC vertically unless noted otherwise on Drawings.
    - c. Install reinforcing 8 IN OC vertically for a minimum of 24 IN at starter courses.
      - 1) Do not install horizontal joint reinforcing in veneer mortar joint having through-wall flashing.
      - 2) Parapets begin at the course immediately above the top of the roof structural member or top of concrete topping slab on precast roof structure.
  2. Reinforcing concrete masonry:
    - a. Install reinforcing bars where indicated on Drawings.
      - 1) Provide means necessary to ensure position of vertical steel reinforcing meets requirements of Building Code.
    - b. At intersecting load-bearing walls, provide rigid steel anchors 16 IN OC vertically, embed ends in grout filled cores.
      - 1) Alternate rigid steel anchors with horizontal joint reinforcing.
    - c. At intersecting non-load bearing walls or at intersecting load bearing/non-load bearing walls provide mesh wall ties in mortar joint at 16 IN OC vertically.
      - 1) Extend minimum 6 IN into each wall.
      - 2) Alternate mesh wall ties with horizontal joint reinforcing.
  3. Repair all galvanized coatings damaged as a result of welding.
    - a. See Specification Section 05 50 00 for galvanizing repair system.
- E. Install reglets as walls are being constructed.
  1. Set reglets true with wall, plumb and at consistent depth.
- F. Remove all excess mortar and grout from reglets as walls are being constructed and protect reglet openings from filling with mortar, grout and other construction debris.

## END OF SECTION

**SECTION 04 05 50**  
**COLD AND HOT WEATHER MASONRY CONSTRUCTION**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Cold weather protection.
  - 2. Hot weather protection.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Brick Industry Association (BIA):
    - a. Technical Note 1, Cold and Hot Weather Construction.
  - 2. Masonry Standards Joint Committee (MSJC):
    - a. Specification for Masonry Structures (ACI 530.1/ASCE 6/TMS 602); referred to herein as MSJC Specification.
  - 3. National Concrete Masonry Association (NCMA).
    - a. TEK 3-1C, All Weather Concrete Masonry Construction.

**1.3 DEFINITIONS**

- A. As defined in MSJC Specification.

**PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)****PART 3 - EXECUTION****3.1 ERECTION AND APPLICATION**

- A. General:
  - 1. Comply with NCMA TEK 3-1C [and BIA Tech Note 1] recommendations and practices.
  - 2. Do not use frozen or ice coated materials.
  - 3. At end of each day or at shutdown, cover tops of all walls not enclosed or sheltered with clear polyethylene minimum 6 MIL thick.
    - a. Extend down each side of wall minimum of 16 IN and secure.
- B. Temporary Facilities:
  - 1. Construct and maintain temporary protection required to permit continuous and orderly progress of work.
  - 2. Provide and maintain heat sufficient to assure temperature above 32 DEGF within protected areas.
  - 3. Remove all temporary facilities after completion of work.
- C. Cold Weather Construction and Protection Requirements:
  - 1. Prior to and during installation:
    - a. Air temperature 32 to 40 DEGF: Heat mixing water or aggregate to produce mortar temperatures between 40 and 120 DEGF.
    - b. Air temperature 25 to 32 DEGF:
      - 1) Heat mixing water or aggregate to produce mortar temperatures between 40 and 120 DEGF.
      - 2) Maintain mortar temperatures above freezing until used.

- c. Air temperature below 25 DEGF:
  - 1) Heat mixing water and aggregate to produce mortar temperatures between 40 and 120 DEGF.
  - 2) Maintain mortar temperatures above freezing until used.
  - 3) Maintain temperature of units until laid at not less than 40 DEGF.
  - 4) Provide heat on both sides of walls under construction to maintain air temperature above freezing.
  - 5) Provide windbreaks or shelters when wind is in excess of 15 MPH.
    - a) Wind breaks or shelters shall be translucent.
- 2. After installation:
  - a. Air temperature 32 to 40 DEGF: Protect from rain or snow for not less than 24 HRS by covering with weather-resistive translucent membrane.
  - b. Air temperature 25 to 32 DEGF: Completely cover with translucent weather-resistive membrane for not less than 24 HRS.
  - c. Air temperature 20 to 25 DEGF: Completely protect with insulating blankets for not less than 24 HRS or provide other protection approved by Engineer.
  - d. Air temperature below 20 DEGF:
    - 1) Provide enclosed translucent shelters and heating to maintain air temperature on each side of wall above 32 DEGF for 24 HRS.
    - 2) Do not allow rapid drop in temperature after removal of heat.
  - e. Promptly repair all tears, holes, etc., to translucent membrane and shelter using compatible patching material and tape as recommended by membrane manufacturer.
- D. Hot Weather Construction and Protection Requirements:
  - 1. Comply with requirements of NCMA[, BIA] and MSJC Specification.
  - 2. Storage and preparation of materials.
    - a. Cover or shade masonry units and mortar materials from direct sun.
    - b. Maintain sand in a damp loose condition.
      - 1) Sand moisture shall be maintained at minimum 8 PCT.
      - 2) Sprinkle with cool water as required to maintain moisture content.
    - c. Use cool water for mixing mortars.
    - d. Avoid using tools and equipment that have been sitting in the sun.
      - 1) Sprinkle mortar boards, mortar pans, wheel barrows, mixers, etc., with cool water.
    - e. Do not wet concrete masonry units prior to use.
  - 3. Installation:
    - a. Place masonry units within one minute of the spreading of the mortar.
      - 1) Mortar beds shall not be spread more than 4 FT ahead of the masonry unit being placed.
    - b. Provide wind screens and shading partitions as required to eliminate direct sunlight exposure.
    - c. Wet installed units using fog spray of clean water.
    - d. Cover installed work immediately after installation to slow rate of loss of moisture from units.
    - e. Fog-spray new masonry work until damp.
      - 1) Repeat fog spraying minimum of three times per day until masonry work has cured for 72 HRS.
      - 2) In high humidity conditions, Engineer reserves the right to discontinue fog spraying if operation is found to be introducing excessive amounts of moisture into the Work.

## END OF SECTION



## **SECTION 04 22 00 CONCRETE MASONRY**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Concrete masonry construction (CMU), including:
    - a. Standard concrete masonry.
    - b. Precast concrete lintels.
  - 2. Integral water repellent admixture.
  - 3. Masonry special inspection.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 03 21 00 - Reinforcement.
  - 4. Section 03 31 30 - Concrete, Materials and Proportioning.
  - 5. Section 04 05 13 - Masonry Mortar and Grout.
  - 6. Section 04 05 23 - Masonry Accessories.
  - 7. Section 04 05 50 - Cold and Hot Weather Masonry Construction.
  - 8. Section 07 21 00 - Building Insulation.
  - 9. Section 07 92 00 - Joint Sealants.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. C33, Standard Specification for Concrete Aggregates.
    - b. C55, Standard Specification for Concrete Building Brick.
    - c. C90, Standard Specification for Loadbearing Concrete Masonry Units.
    - d. C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
    - e. C426, Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.
    - f. C1357, Standard Test Methods for Evaluating Masonry Bond Strength.
    - g. E514, Standard Test Method for Water Penetration and Leakage Through Masonry.
  - 2. The Masonry Society (TMS):
    - a. Building Code Requirements and Specification for Masonry Structures (TMS 402/TMS 602); referred to herein as TMS Specification.
  - 3. National Concrete Masonry Association (NCMA):
    - a. TEK 2-3A, Architectural Concrete Masonry Units.
    - b. TEK 3-4B, Bracing Concrete Masonry Walls During Construction.
    - c. TEK 8-2A, Removal of Stains from Concrete Masonry.
    - d. TEK 8-3A, Control and Removal of Efflorescence.
  - 4. Building code:
    - a. Florida Building Code, 2020 Edition including all amendments, referred to herein as Building Code.
- B. Concrete masonry unit manufacturer shall be licensed or qualified, in writing, by manufacturer of integral water repellent admixture to produce masonry units containing manufacturer's admixture.
  - a. Concrete masonry unit manufacturer shall have a minimum of five years experience producing masonry units containing manufacturer's admixture.
- C. Mock-Ups:
  - 1. Build in conjunction with work in:

- a. Specification Section 04 21 13.
  - 2. Prior to permanent wall construction, construct mock-up.
    - a. Construct mock-up on a concrete slab or footing as necessary to demonstrate construction details.
      - 1) Minimum slab thickness: 4 IN.
    - b. Mock-up shall show full color range, texture and bond pattern(s) of all masonry specified.
    - c. Mock-up shall be as large as required to properly display all conditions required by the building masonry construction.
      - 1) Minimum 4 FT high x 8 FT long.
        - a) Return corners and intersections minimum 4 FT.
      - 2) Mock-up shall demonstrate:
        - a) Outside corner condition.
        - b) Inside corner condition.
        - c) Intersection of interior masonry partition.
        - d) Jamb condition demonstrating lintel bearing and flashing.
        - e) Masonry control joint.
    - d. Include all special corners and other special CMU detailing shown on Drawings.
    - e. Mock-up shall include, as a minimum:
      - 1) All types of masonry.
        - a) All special shapes.
        - b) All types of back-up wall system(s).
      - 2) Vertical wall reinforcing with grouted cell.
      - 3) Typical bond beam construction.
      - 4) Typical lintel construction.
      - 5) Positioning, securing and lapping of reinforcing steel.
      - 6) Masonry accessories:
        - a) Horizontal joint reinforcing.
          - (1) Positioning and lapping of joint reinforcing.
        - b) Veneer anchorage system(s).
        - c) Thru wall flashing [and drip edge].
          - (1) Demonstrate inside and outside corner conditions showing thru wall flashing lapping, jointing and sealing
        - d) Weep joint mortar protection system.
        - e) Weep joints and weep vents,
        - f) Typical control joint construction.
        - g) Mesh wall ties.
        - h) Rigid steel masonry anchors.
      - 7) Insulation.
      - 8) Cleaning of masonry work.
  - 3. Step construction of mock-up to allow observation of all components.
  - 4. Mock-up shall constitute minimum standard of quality for actual construction.
    - a. Maintain mock-up during construction.
  - 5. If not acceptable, construct additional mock-ups as required.
  - 6. Remove when directed by Engineer.
- D. All masonry units of any one particular type, color or face style shall be from the same production run.
- 1. Special shapes shall be factory fabricated unless noted otherwise.

### 1.3 DEFINITIONS

- A. Definitions to be in accordance with Standard Unit Nomenclature Table 1, NCMA TEK 2-3A.

### 1.4 SUBMITTALS

- A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  2. Product technical data including:
    - a. Manufacturer's information on aggregate and cement type used in manufacture.
  3. Drawings:
    - a. Scaled (minimum 1/8 IN per foot) plans showing proposed locations of masonry control joints.
    - b. Wall elevations and sections, indicating special shapes, shape part numbers, applicable dimensions.
    - c. Detail drawings for:
      - 1) Precast concrete lintels.
        - a) Show profiles, cross-sections, reinforcement and steel components.
  4. Certifications:
    - a. Certification that concrete masonry units meet or exceed requirements of standards referenced.
    - b. Certification that fire-resistive rated units meet the requirements of the Building Code.
    - c. Certification that integral water repellent admixture will not affect the use of coloring processes or alter the actual colors of factory colored masonry units.
    - d. Data sheets on integral water repellent admixture being used in masonry unit manufacturing.
    - e. Technical bulletins on cleaning masonry containing integral water repellent.
    - f. Certification of integral water repellent admixture dosage rates from concrete masonry unit producer.
    - g. Concrete masonry producer shall certify that integral liquid water repellent admixture has been provided at dosage rate recommended by admixture manufacturer for use in exterior wall construction.
  5. Qualifications of testing lab and technician.
  6. Test results for all masonry testing.
- B. Samples:
1. Concrete Masonry Finish Samples: Manufacturer's complete offering of colors and textures for each type of masonry specified.
    - a. Minimum 3 IN SQ samples for initial selection.
    - b. Provide two, 8 IN SQ samples if each type of masonry selected for final approval.
    - c. Samples of standard gray masonry will not be required.
- C. Informational Submittals:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver units on pallets with tight covers or deliver in cubes and store on dunnage.
- B. Protect units from damage.
- C. Inspect units upon delivery for damage, to assure color match with mock-up or approved samples, dimensional quality, and trueness of unit.
  1. Remove damaged or otherwise unacceptable units from the Project Site.
- D. Store units in accordance with manufacturer's recommendations.

## PART 2 - PRODUCTS

1. MANUFACTURERSSubject to compliance with the Contract Documents, the following manufacturers are acceptable:Standard masonry units:
  - a. Any manufacturer capable of meeting the requirements of this Specification Section.
2. Integral water repellent admixture:
  - a. GCP Applied Technologies, Inc.

- b. ACM Chemistries, Inc.

## 2.2 MATERIALS

- A. Cement: Type I or II Portland, ASTM C150.
- B. Aggregate: ASTM C33.
- C. Reinforcing Bars: Refer to Specification Section 03 09 00.
- D. Mortar: Refer to Specification Section 04 05 13.
- E. Masonry Grout: Refer to Specification Section 04 05 13.
- F. Masonry Accessories: Refer to Specification Section 04 05 23.
- G. Insulation: Refer to Specification Section 07 21 00.
- H. Sealants: Refer to Specification Section 07 92 00.
- I. Integral Concrete Masonry Water Repellent:
  - 1. Liquid polymeric admixture.
  - 2. GCP Applied Technologies, Inc., "DRY-BLOCK".

## 2.3 MANUFACTURED UNITS

- A. General:
  - 1. Fire resistive units: Fabricate to meet the Building Code.
  - 2. Fabricated in the manufacturing plant.
  - 3. Provide square corners unless noted otherwise.
- B. Concrete Masonry Units:
  - 1. Modular units: ASTM C90.
    - a. Normal weight units: Minimum of 125 LB/CUFT.
    - b. Light weight or medium weight units are not acceptable.
  - 2. Concrete bricks:
    - a. Structural units: ASTM C55.
      - 1) Same material, texture and density as modular units.
  - 3. Color:
    - a. Interior units: Standard gray.
  - 4. Design compressive strength:  $f'_m=1,900$  PSI minimum.
    - a. Determine in accordance with TMS Specification.
      - 1) Unit strength method, sampled and tested in accordance with ASTM C140.
  - 5. Provide masonry units manufactured with integral water repellent admixture for the following exposures:
    - a. Exterior veneer.
    - b. Exterior single-wythe construction.
    - c. Exterior composite wall construction.
    - d. Interior areas defined as wet and/or corrosive.
      - 1) See Specification Section 07 92 00 for definition of wet and/or corrosive areas.
  - 6. Special shapes and faces:
    - a. Corner units.
      - 1) Corner units used in veneer wythe shall have a finished return leg one-half the length of a standard modular stretcher unit.
      - 2) Corner units shall maintain regular modular masonry coursing.
    - b. Finished end units.
    - c. Other special shapes as indicated on Drawings or necessary to maintain coursing.
- C. Precast concrete lintels:
  - 1. Concrete: See drawings as applicable.
  - 2. Reinforcing: See drawings as applicable.
  - 3. Embedded steel components: Galvanized.
    - a. See Specification Section 05 50 00.

## 2.4 PERFORMANCE AND DESIGN REQUIREMENTS:

- A. Integral Concrete Masonry Water Repellent:
  - 1. Water permeance of masonry: Capable of achieving a Class E Rating when evaluated using ASTM E514 with the test extended to 72 HRS, using the rating criteria specified in ASTM E514.
  - 2. Flexural bond strength of masonry: An increase of 10 PCT, minimum, in masonry flexural bond strength shall occur as a result of adding integral water-repellent concrete masonry and mortar admixtures when compared to a control (containing no admixtures) concrete masonry and mortar tested in accordance with ASTM C1357.
  - 3. Compressive strength validation shall be per unit strength method.
  - 4. Drying shrinkage of masonry: Maximum 5 PCT increase in drying shrinkage of the concrete masonry units shall occur as a result of adding integral water repellent concrete masonry admixture when compared to a control (containing no admixtures) concrete masonry when tested in accordance with ASTM C426.
  - 5. Grout shear bond strength: Maximum 5 PCT decrease in grout shear bond strength shall occur as a result of adding integral water repellent admixture to the concrete masonry units when compared to a control (containing no admixtures).

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Verify that anchors and flashings are correct.
- B. Lay out walls in advance for uniform and accurate spacing of bond patterns and joints.
  - 1. Properly locate openings, movement type joints, returns, offsets, weep joints, and weep vents.

### 3.2 INSTALLATION

- A. General:
  - 1. Perform all cutting using masonry saw blades.
  - 2. Drill holes using masonry drill bits or core drill.
    - a. Holes made by chipping unit will not be accepted.
  - 3. Install field units in running bond, unless noted otherwise.
    - a. Provide special coursing where indicated on the Drawings.
  - 4. Cut as required to maintain bond pattern.
  - 5. Use solid units where cutting or laying would expose holes and as noted on Drawings.
  - 6. Avoid use of less than half size units, whenever possible.
  - 7. Do not use chipped, cracked, spalled, stained or imperfect units exposed in finish work.
  - 8. Provide units of uniform color, within the range demonstrated on the approved mock-up.
  - 9. Do not wet concrete masonry units.
  - 10. Build chases and recesses as indicated and required for work of other trades.
    - a. Provide not less than 8 IN of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses unless detailed otherwise on the Drawings.
  - 11. In fire-resistive rated wall construction, install fire resistive units in accordance with the Building Code.
- B. Concrete Masonry Units:
  - 1. Grout solid all cells containing steel reinforcing and as indicated on Drawings.
    - a. Refer to Specification Section 04 05 13 for grouting.
- C. Laying and Tooling:
  - 1. Lay masonry units with completely filled bed and head joints.
    - a. Provide full mortar bed on all block cross webs and completely fill head joints.
      - 1) Do not slush head joints.
      - 2) Protect cells requiring grout fill from mortar droppings.
      - 3) Omit mortar from head joint at weep joint opening.

2. Maintain nominal 3/8 IN joint widths.
    - a. Cut joints flush where concealed and where veneer plaster coating is required.
    - b. Tool exposed joints concave.
    - c. Compress mortar in below ground joints and in joints concealed by insulation in cavity wall construction.
    - d. Provide wider joints where noted on Drawings.
      - 1) In no case shall any mortar joint be more than 3/4 IN wide.
    - e. Where masonry sits on top of steel support omit the mortar joint on top of the support and sit masonry directly on top of the thru wall flashing or the steel support member unless a mortar joint is required to maintain coursing.
  3. During tooling of joints, enlarge any voids or holes except weeps, and completely fill with mortar.
  4. Point-up all joints at corners, openings, and adjacent work to provide neat, uniform appearance.
  5. Remove masonry disturbed after laying.
    - a. Clean and relay in fresh mortar.
    - b. Do not pound units to fit.
    - c. If adjustments are required, remove units, clean, and reset in fresh mortar.
  6. Where work is stopped and later resumed, rack back 1/2 masonry unit length in each course.
    - a. Remove loose units and mortar prior to laying fresh masonry.
  7. As work progresses, build in items indicated on Drawings and specified.
    - a. Fill in solidly with mortar around built-in items.
    - b. Where built-in items are to be embedded in cores of hollow masonry units, place grout screen in joint below and fill core solid with mortar.
- D. Control Joints and Sealants:
1. Provide vertical expansion, control and isolation joints where indicated on Drawings.
  2. Where not indicated on Drawings, submit proposed control joint locations in accordance with the following requirements:
    - a. Provide control joints at maximum 24 FT OC.
    - b. Provide at all T intersections.
    - c. Locate joints so as to allow lintels and bond beams above and below openings to extend beyond the opening as indicated on the Drawings without control joints thru the lintel or bond beam.
  3. Rake out mortar in joint.
  4. Refer to Specification Section 07 92 00 for sealant installation requirements.
    - a. Seal control and expansion joints.
- E. Tolerances:
1. Maximum variation from plumb in vertical lines and surfaces of columns, walls, and arises:
    - a. 1/4 IN in 10 FT.
    - b. 3/8 IN in a story height not to exceed 20 FT.
    - c. 1/2 IN in 40 FT or more.
  2. Maximum variation from plumb for external corners, expansion joints, and other conspicuous lines:
    - a. 1/4 IN in any story or 20 FT maximum.
    - b. 1/2 IN in 40 FT or more.
  3. Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
    - a. 1/4 IN in any bay or 20 FT.
    - b. 1/2 IN in 40 FT or more.
  4. Maximum variation from plan location of related portions of columns, walls, and partitions:
    - a. 1/2 IN in any bay or 20 FT.
    - b. 3/4 IN in 40 FT or more.
  5. Maximum variation in cross-sectional dimensions of columns and thicknesses of walls from dimensions shown on Drawings:

- a. Minus 1/4 IN.
  - b. Plus 1/2 IN.
- 6. Maximum variation in mortar joint width:
  - a. Bed joints: 3/32 IN in 10 FT.
  - b. Head joints:
    - 1) Minus 1/8 IN.
    - 2) Plus 1/8 IN.
- F. Protect against weather when work is not in progress.
  - 1. During inclement weather conditions, cover top of walls with translucent waterproof membrane.
  - 2. See Specification Section 04 05 50.
- G. Protect against cold/hot weather as specified in Specification Section 04 05 50.

### 3.3 FIELD QUALITY CONTROL

- A. Bracing Concrete Masonry Walls During Construction:
  - 1. At a minimum, provide bracing in accordance with NCMA TEK 3-4B.
  - 2. Contractor is responsible for adequately bracing all masonry during construction.
- B. Remove and replace loose, stained, damaged and other unacceptable units as directed by Engineer.
  - 1. Provide new units to match.
  - 2. Install in fresh mortar.
  - 3. Point to eliminate evidence of replacement.
- C. Special Masonry Inspection:
  - 1. Masonry inspection services will be provided during the following construction activities:
    - a. Cost of masonry inspection services will be paid by Owner.
    - b. During laying of units:
      - 1) During the first day of the masonry construction, inspect proportions of site prepared mortar, construction of mortar joints, location of all reinforcing and connectors, size and location of structural elements, type, size and location of anchors, protection of masonry during cold weather.
      - 2) Inspection to be continuous the first full day of masonry construction which requires special inspection.
        - a) Thereafter, a minimum of 3 HRS every third day of construction until the concrete masonry work is complete.
      - 3) Inspection while laying masonry units may be made concurrently with other inspection duties provided all inspection duties are adequately performed.
      - 4) When deficiencies are found, additional inspection shall be provided as required until deficiencies have been corrected.
      - 5) If masonry crews change, an additional full day of inspection is required during the first day the new crew is on-site.
    - c. Placement of reinforcing steel:
      - 1) Verification of all reinforcing including size, grade, lap lengths, and type.
      - 2) Inspection may be periodic as required to verify all reinforcing.
      - 3) Inspector to be present during the concrete pour in which any dowels connecting concrete to masonry are cast.
        - a) Inspector to verify proper location of dowels.
    - d. Prior to each grouting operation, verify that grout space is clean, reinforcing is clean and connectors are properly placed, proportions of site-prepared grout are correct and mortar joints have been properly constructed.
      - 1) Inspection may be periodic as required to verify proper grout space.
    - e. Verify compliance with Building Code and Specifications continuously during all grouting operations.

- f. Provide special inspection in accordance with TMS Specification Level 3 Quality Assurance including observation of masonry work for conformance to the Contract Documents:
  - 1) Provide inspection reports to the Engineer, Building Official and Owner.
    - a) Notify Contractor of discrepancies for correction.
    - b) Notify Engineer, Building Official and Owner, in writing, when discrepancies have been satisfactorily corrected.
  - 2) Submit final signed report stating that work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the Contract Documents and the applicable workmanship provisions of the Building Code.

### **3.4 CLEANING**

- A. Clean concrete masonry as the wall is being constructed using fiber brushes, wooden paddles and scrapers.
  - 1. Do not use metal tools or wire brushes.
  - 2. No acid-based cleaning solutions shall be used unless approved in writing by Engineer.
- B. Remove dirt and stains in accordance NCMA TEK 8-2A.
- C. Remove primary efflorescence in accordance with NCMA TEK 8-3A.

### **END OF SECTION**





**DIVISION 05**

**METALS**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 05 21 00 STEEL JOISTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Manufactured open-web steel joists and joist accessories.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 01 45 33 - Special Inspections and Testing Program.
  - 4. Section 05 50 00 - Metal Fabrications.
  - 5. Section 05 30 00 - Metal Deck.
  - 6. Section 09 110 – Architectural Painting

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Institute of Steel Construction (AISC):
    - a. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
  - 2. ASTM International (ASTM):
    - a. A36, Standard Specification for Carbon Structural Steel.
    - b. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
    - c. A563, Standard Specification for Carbon and Alloy Steel Nuts.
    - d. F436, Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
    - e. F3125, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
  - 3. American Welding Society (AWS):
    - a. D1.1, Structural Welding Code - Steel.
  - 4. Corps of Engineers (COE):
    - a. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
  - 5. Steel Joist Institute (SJI):
    - a. Recommended Code of Standard Practice for Steel Joists and Joist Girders.
    - b. Standard Specification for Open Web Steel Joists, K-Series (ANSI SJI-K-1.1).
    - c. Standard Specification for Longspan Steel Joists LH-Series and Deep Longspan Steel Joists DLH-Series (ANSI SJI-LH-DLH-1.1).
    - d. Standard Specification for Joist Girders (ANSI SJI-JG-1.1).
    - e. Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders:
      - 1) Standard Load Table Open Web Steel Joists, K-Series.
      - 2) Standard Load Table Longspan Steel Joists, LH-Series.
      - 3) Standard Load Table Deep Longspan Steel Joists, DLH-Series.
- B. Qualifications:
  - 1. Manufacturer: Member of SJI.
    - a. Structural design calculations and details of manufactured joists shall be prepared by a qualified professional engineer retained by the manufacturer and registered in the state where the project is located.
  - 2. Qualification of welding work:

- a. Qualify welding processes, operations, and operators in accordance with requirements of AWS D1.1.
- b. Welding operators to have been qualified during the 12-month period prior to commencement of welding.

### 1.3 SUBMITTALS

- A. Shop Drawings:
  1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  2. Fabrication and/or layout drawings, signed by a professional engineer:
    - a. Detailed Shop Drawings showing size and layout of each joist unit, bridging, connections, and accessories. Include mark, number, type, location, and spacing of joists and bridging.
    - b. Show joining splice and connection to other work details.
    - c. Provide templates or location drawings for installation of anchor bolts.
    - d. Provide details of bridging, method of attachment to joists, and joist end anchorage and other details required for joist installation. Indicate beveled end plates for joist roof pitch where required.
    - e. Show shop-applied coatings.
    - f. Shop Drawings shall not be reproductions of the Contract Drawings.
  3. Product technical data including:
    - a. Joist manufacturer's load tables, Standard Specifications and installation instructions for each type of joist and its accessories. Include product data describing materials, shop coating, bridging, and accessories.
  4. Certifications:
    - a. Manufacturer's certification that steel joists and accessories comply with specified requirements.
    - b. Manufacturer member of SJI.
    - c. Joist material, shop welding and testing, manufacturing and shop inspection and testing are in accordance with SJI requirements.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle steel joists as recommended by SJI.
  1. Exercise care to avoid damage to joists.
- B. Store joists clear of soil on platforms, skids or other durable supports.
  1. Protect joists after delivery to prevent rust and deterioration.
- C. Provide anchor bolts and other items to be embedded in concrete or masonry, with templates as required, in time for incorporation into the work.

## PART 2 - PRODUCTS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  1. Nucor Corporation Vulcraft Divisions.
  2. CANAM Steel Corporation.
  3. Socar Incorporated.

### 2.2 MATERIALS

- A. Steel: Comply with SJI and AISC Specifications for joist series indicated.
- B. High-Strength Bolts, Nuts and Washers:
  1. Bolts: ASTM F3125, Grade A325 or Grade A490 as required, heavy hexagon structural bolts.
  2. Nuts: ASTM A563.
  3. Washers (hardened): ASTM F436.

- C. Bolts and Nuts, Unfinished: ASTM A307, Grade A, regular hexagon type, low carbon steel, with carbon steel washers.

### 2.3 STEEL JOISTS

- A. Design of steel joists proposed shall have been checked by the SJI and found to conform to the standard specifications and load tables.
- B. Design and fabricate joists and accessories in accordance with SJI Specifications and as follows:
1. Make shop connections and splices using either arc or resistance welding.
    - a. Do not shop bolt connections.
  2. Design and fabricate for maximum deflection of 1/360 of clear span under design live load.
  3. Shop holes, field holes, and enlargement of holes will not be permitted unless approved by Engineer.
  4. Fabricate bearing ends to provide following minimum bearing unless a longer bearing length is indicated on the Contract Documents.

	K SERIES	LH AND DLH SERIES	JOIST GIRDERS
ON MASONRY OR CONCRETE:	4 IN min	6 IN min	6 IN min
On steel:	2-1/2 IN min	4 IN min	4 IN min

5. With steel angle tops and bottom chord members.
- C. Special or Concentrated Loads:
1. Design connections to resist uplift loads per Building Code, unless otherwise specified.
- D. Sloped joists shall have bearing ends that are flush to supporting element.
- E. Provide extended bottom chords where indicated.
1. Comply with SJI and AISC requirements and load tables.
- F. Provide extended top chords where indicated.
1. Comply with SJI and AISC requirements and load tables.
- G. Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord.
1. Provide either an extended bottom chord or a separate unit of sufficient strength to support ceiling construction.
  2. Extend ends to within 1/2 IN of wall surface.
- H. Provide nailers bolted to top chord where indicated.
- I. Prepare and paint steel joists and accessories in compliance with Section 09 96 00.
- J. Comply with SJI Specifications:
1. Joist designations indicated on the Drawing are minimum requirements; increase as required to comply with design requirements specified.
  2. Wherever possible, increased joists shall have the same depth as joist indicated on Drawings.
  3. Where necessary to increase joist depths to meet design requirements, coordinate all project changes required due to the increased depth.
  4. Make all required joist revisions at no additional cost to Owner.

### 2.4 SOURCE QUALITY CONTROL

- A. Engineer reserves right to inspect joists or manufacturer's shop during joist fabrication.
- B. Identify each joist type, size and manufacturer.
1. Provide tagging or other suitable (permanent) means.

2. Maintain identification continuously.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Examine areas and conditions under which steel joists are to be installed for conditions detrimental to proper and timely completion of work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Do not start placement of steel joists until supporting work is in place and secured.
- D. Joists will be subject to rejection if:
  1. Joists do not comply with requirements of SJI and AISC Specifications and requirements herein.
  2. Joists are improperly manufactured, welded, painted or installed.
  3. Joists are damaged so that strength is impaired.
  4. Joists are not installed as indicated on Drawings.
  5. Chords are not installed straight within a tolerance of plus or minus 0.0028 times the length of the joist or the distance between points of lateral support.

### **3.2 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
  1. Where not specifically indicated otherwise, place and secure steel joists in accordance with SJI and AISC Specifications and as herein specified.
- B. Splice any joist delivered to the site in more than one piece.
- C. Do not overload joists.
  1. Note: Joists may not be stable or able to carry design loads until bridging and deck is fully installed.
  2. Contractor is solely responsible for safety, construction methods and sequencing of the Work.
  3. Do not install joists damaged so that strength is impaired.
- D. Place joists on supporting work, adjust and align in accurate location and spacing before permanently fastening.
  1. Provide end bearing and anchorages to secure all joists to supporting members or walls in accordance with SJI Specifications, unless otherwise indicated.
  2. When joists are misfabricated and do not bear flush on supporting member or wall, take corrective measures to ensure full bearing.
    - a. Provide steel shims as required for uniform flush bearing.
- E. Field weld joists to supporting steel framework in accordance with SJI, AISC and AWS Specifications for type of joists used.
  1. Coordinate welding sequence and procedure with placing of joists.
  2. Observe any special welding requirements on erection drawings.
- F. Bearing on Masonry or Concrete Bearing Surfaces:
  1. Secure joists resting on masonry or concrete bearing surfaces by bedding in mortar and anchoring to masonry or concrete construction as specified in SJI Specifications for type of steel joist used.
    - a. Masonry or concrete required to support joists to have reach required 28-day compressive strength prior to placing joists thereon.
    - b. Area under joist bearing shall be solidly filled with grout.
  2. Furnish anchor bolts or steel bearing plates to be built into concrete and masonry construction.
    - a. Furnish templates as may be necessary for accurate location of anchors. Steel bearing plates to conform to ASTM A36.

3. Bedding mortar:
  - a. Sand cement grout:
    - 1) Approximately 3 parts sand, 1 part Portland cement, 6 plus/minus 1 PCT entrained air and water to produce a slump which allows grout to completely fill required areas and surround adjacent reinforcing.
    - 2) Minimum 28-day compressive strength: 3000 PSI.
  - b. Non-shrink grout complying with COE CRD-C621.
- G. Provide type, size, spacing, and attachment of bridging in accord with SJI and AISC Specifications, where not specifically indicated otherwise, except as modified herein.
  1. Clearly specify bridging on erection drawings.
  2. Provide diagonal type bridging unless otherwise noted.
  3. Do not use sag rods as substitute for bridging.
- H. Install bridging completely, immediately after erection, and before any loads are applied.
  1. Anchor ends of bridging lines at top and bottom chords of each joist and where terminating at walls or beams.
  2. Provide bridging connections at top and bottom chords capable of safely resisting a force specified by SJI Specifications for open web, long span, deep long span joists, and joist girders respectively.
  3. Where five rows of bridging are required in spans over 40 FT, laterally brace each joist before erecting next joist or applying loads.
  4. Do not release hoisting cables before installing center row of diagonal bridging and anchoring bridging line to prevent lateral movement.
  5. During construction period, Contractor is responsible for any loads placed on joists.
    - a. Contractor's attention is directed the fact that joists may be unstable and cannot carry their design load until steel deck and bridging are completely installed.
- I. Remove or repair damaged joists or other work, to satisfaction of Engineer at no additional expense to Owner.
- J. After installation, touch up paint or field paint as specified in Section 09 91 10.

### 3.3 FIELD QUALITY CONTROL

- A. Special Inspection and Testing:
  1. See Section 01 45 33.
  2. Special Inspection is required for:
    - a. Visually inspect joists, bridging, anchorages, and connections which have been erected.
    - b. Inspect high-strength bolting in accordance with the RCSC Specification for Structural Joints Using High-Strength Bolts, Section 9.
      - 1) Verify direct tension indicator gaps.

### END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK.



## **SECTION 05 30 00 METAL DECK**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Manufactured metal roof deck.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 05 21 00 - Steel Joists.
  - 4. Section 09 91 10 - Architectural Painting.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Iron and Steel Institute (AISI):
    - a. S100, Specification for the Design of Cold-Formed Steel Structural Members.
  - 2. ASTM International (ASTM):
    - a. A36/A36M, Standard Specification for Carbon Structural Steel.
    - b. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - c. A780/A780M, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
    - d. A1008/A1008M, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
    - e. C1513, Standard Specification for Steel Tapping Screws for Cold Formed Steel Framing Connections.
    - f. D746, Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
    - g. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
  - 3. American Welding Society (AWS):
    - a. D1.1/D1.1M, Structural Welding Code - Steel.
    - b. D1.3/D1.3M, Structural Welding Code - Sheet Steel.
  - 4. Steel Deck Institute (SDI):
    - a. 31, Design Manual for Composite Decks, Form Decks and Roof Decks.
  - 5. Underwriters Laboratories, Inc. (UL):
    - a. Fire Resistance Directory.
- B. Qualifications:
  - 1. Manufacturer:
    - a. Member of SDI.
    - b. Structural design of manufactured deck shall be prepared by a qualified professional engineer retained by the manufacturer.
  - 2. Welding work:
    - a. Qualify welding processes, operations, and operators in accordance with requirements of AWS D1.1 and AWS D1.3.
    - b. Welding operators to have been qualified during the 12 month period prior to commencement of welding, and be experienced in welding light gage metal.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:

1. Fabrication and/or layout drawings:
  - a. Detailed Shop Drawings showing the following:
    - 1) Complete framing and erection layouts.
    - 2) Location, length, type, cross section, thickness, and markings of metal deck units.
      - a) Size and location of openings.
      - b) Accessories and reinforcing.
    - 3) Sequence and procedure to be followed for erecting, fastening, and securing the deck units.
    - 4) Shop applied coatings.
    - 5) Details and gages of accessories and miscellaneous items showing sump pans, cant strips, ridge and valley plates, closure and filler strips and insulation supports.
    - 6) Welding procedures for installation including size, number, type and location of all welds required to install deck units.
    - 7) Recommended welding rod size, type, burn off rate and welder setting for deck thickness to be joined.
      - a) Define welds by use of standard AWS welding symbols.
    - 8) Correct fitting of members and accessories.
    - 9) Size and location of all openings in deck and all conditions requiring closure panels and supplementary framing.
    - 10) Shop Drawings shall not be reproductions of the Contract Drawings.
  - b. Metal deck manufacturer's specifications and installation instructions.
  - c. Manufacturer's specifications and installation instructions for:
    - 1) Welds and welding procedure.
    - 2) Galvanizing repair paint.
    - 3) Screws.
    - 4) Joint sealing compound.
  - d. Manufacturer's load tables for deck to be furnished on this project, including:
    - 1) Allowable gravity load for metal roof deck.
    - 2) Allowable diaphragm shear values for metal roof deck.
    - 3) Allowable superimposed load for metal deck.
    - 4) Allowable unshored span lengths for composite and form deck.
2. Product technical data including:
  - a. Metal deck manufacturer's specifications and installation instructions.
  - b. Manufacturer's specifications and installation instructions for:
    - 1) Welds and welding procedure.
    - 2) Galvanizing repair paint.
    - 3) Screws.
    - 4) Joint sealing compound.
  - c. Manufacturer's load tables for deck to be furnished on this project, including:
    - 1) Allowable gravity load for metal roof deck.
    - 2) Allowable diaphragm shear values for metal roof deck.
    - 3) Allowable superimposed load for metal deck.
    - 4) Allowable unshored span lengths for composite and form deck.
3. Manufacturers certification that metal deck complies with specified requirements:
  - a. Manufacturer member of SDI.
  - b. Deck material, manufacturing, and shop testing and inspection are in accordance with SDI requirements.
  - c. Welder qualifications.
4. Test reports.
  - a. Manufacturer's certified test reports.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle metal deck as recommended by SDI.
  1. Exercise care to avoid damage to deck.
- B. Protect materials from rusting, denting or crushing.
  1. Store metal deck on project site off the ground with one end elevated to provide drainage and protected from the elements with a waterproof covering, ventilated to avoid condensation.
  2. Prevent rust, deterioration and accumulation of foreign material.

#### 1.5 PROJECT CONDITIONS

- A. Do not overload supporting members.
  1. Until the entire assembly is complete, the structural elements may not be stable or capable of supporting code or stated design loads.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. 1-1/2 IN deep metal roof deck:
    - a. Vulcraft.
    - b. Verco Decking, Inc.
    - c. New Millennium Building Systems.
    - d. Consolidated Systems, Inc.
    - e. DACS, Inc.

### 2.2 METAL ROOF DECK

- A. Design of the metal deck to be supplied to have been checked by SDI and found to conform to the standard specifications and load tables.
1. The allowable superimposed live uniform loading per square foot for metal roof deck supplied for the spans indicated shall equal or exceed the allowable superimposed live uniform load per square foot for the same spans as indicated in the SDI latest tables.
  2. Maximum deflection: Less than 1/240 of span under live load.
- B. Use deck configurations complying with SDI 31 and as indicated.
1. Galvanized deck: ASTM A653 G60 zinc coating.
- C. Metal Roof Deck, 1-1/2 IN Deep:
1. Rib type wide, sheet steel, 20 GA, minimum, with minimum uncoated thickness of 0.0358 IN, galvanized.
  2. Wide rib deck: Ribs spaced approximately 6 IN OC; width of rib opening at top surface maximum 2-1/2 IN; width of bottom rib surface minimum 1-3/4 IN.

### 2.3 FABRICATION

- A. Standard Deck Profiles:

DEPTH	TYPE	RIB SPACING	TOP SURFACE MAXIMUM RIB OPENING	MINIMUM BOTTOM OF RIB WIDTH
1-1/2 IN	Roof Deck - Narrow Rib ('A')	6 IN	1 IN	3/8 IN
1-1/2 IN	Roof Deck - Intermediate Rib ('F')	6 IN	1-3/4 IN	1/2 IN
1-1/2 IN	Roof Deck - Wide Rib ('B')	6 IN	2-1/2 IN	1-3/4 IN
3 IN	Roof Deck ('N')	8 IN	2-3/4 IN	1-1/2 IN
1-1/2 IN	Form Deck ('C')	6 IN	1-3/4 IN	2-1/2 IN (max)
1-1/2 IN	Composite Floor Deck	6 IN	2-1/2 IN	1-3/4 IN
2 IN	Composite Floor Deck	12 IN	7 IN	5 IN
3 IN	Composite Floor Deck	12 IN	7-1/4 IN	4-3/4 IN
3 IN	Composite Floor Deck	8 IN	2-3/4 IN	1-3/4 IN

- B. Minimum Deck Thickness:
1. Where gage of metal is indicated, provide the minimum uncoated thickness as specified by SDI.
    - a. Delivered thickness of the uncoated steel: No less than 95 PCT of the design thickness.
  2. Use steel with a minimum yield stress of 50 KSI.

## C. Fabrication:

1. Fabricate deck units in lengths to span three or more support spacings with flush, telescoped or nested 2 IN minimum end laps.
  - a. End laps shall occur on supporting members.
  - b. Provide deck units having overlapping male and female type side laps or joints to provide positive vertical and lateral alignment of adjacent deck units.

**2.4 ACCESSORIES**

## A. Metal Closures:

1. Form to configuration required to provide tight-fitting closures at open ends and sides of deck.
2. Minimum thickness before galvanizing: 0.0358 IN (20 GA).

## B. Ridge and Valley Plates:

1. Minimum width: 4-1/2 IN.
2. Bend to provide tight-fitting closure with deck units.
3. Provide plates in 10 FT length where possible.
4. Minimum thickness before galvanizing: 0.0358 IN (20 GA).

## C. Welding Washers:

1. 16 GA bent steel plate with 3/8 IN center hole.
2. Use at all deck units thinner than 20 GA.

## D. Filler Sheet: Flat or formed 20 GA galvanized steel.

## E. Roof Sump Pans:

1. Fabricate from a single piece of galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain.
2. Provide sump pans of adequate size to receive roof drains with bearing flanges minimum 3 IN wide.
3. Recess pans not less than 1-1/2 IN below roof deck surface, unless otherwise indicated or required by deck configuration.
4. Minimum thickness before galvanizing: 0.0747 IN (14 GA).

## F. Cant Strips:

1. Bend cant strips to form 45 degree slope not less than 5 IN wide, with top and bottom flanges not less than 3 IN wide.
2. Minimum thickness before galvanizing: 0.0358 IN (20 GA).

## G. Insulation supports.

## H. Venting: Slotted openings in bottom flutes in accordance with manufacturer's standards.

## I. Metal Pour Stops: Form to configuration required to provide mortar-tight closures at open sides and ends of deck.

## J. Primer Paint: Deck manufacturer's baked on, rust-inhibitive paint applied at plant to chemically cleaned and phosphate chemically treated metal surfaces. Not for galvanized material.

## K. Galvanized coating for metal deck accessories: Conform to ASTM A653 G60zinc coating.

## L. Galvanized Repair Paint: See Specification Section 05 50 00.

## M. Screws:

1. Self-drilling, self-tapping, #12 size minimum, hex washer head sheet metal screws.
2. Carbon steel by Hilti.
  - a. Organic zinc chromate coated, Hilti Kwik Flex.
  - b. ASTM C1513.

## N. Powder Actuated Mechanical Fasteners:

1. Material: AISI 1070 modified.
2. Hardness: Minimum Rockwell Hardness C 54.5.

3. Strength: Minimum tensile strength 285 KSI; minimum shear strength 175 KSI.
4. Design and Manufacture: Knurled shank with forged ballistic point. Manufacturing process shall ensure steel ductility and prevent development of hydrogen embrittlement.
5. Washers:
  - a. For steel bar joist framing: Minimum 12 MM (0.472 IN) steel washers.
  - b. For structural steel framing: Minimum 15 MM (0.591 IN) steel washers.
6. Corrosion Resistance:
  - a. For steel roof decks with waterproofing membrane: 5 micron zinc electroplated in accordance with ASTM B633 SC1 Type III.
  - b. For exposed steel roof decks: Minimum AISI 304 stainless steel sealing caps with bonded neoprene washer shall be installed over each fastener.
7. Design Requirements:
  - a. ICC-ES AC43 or SDI method for diaphragm shear strength and stiffness.
  - b. FM wind uplift resistance.
  - c. UL fire classification.
8. Approved Types:
  - a. For use with steel bar joist and light structural steel framing supports with top chord or flange thickness 1/8 IN to 3/8 IN:
    - 1) Hilti X-HSN24 (1/8 IN up to and including 3/8 IN).
    - 2) Other approved alternative
  - b. For use with structural steel framing supports with top flange thickness 1/4 IN or thicker:
    - 1) Hilti X-ENP-19 L15 (1/4 IN or thicker).
    - 2) Other approved alternative.
- O. Miscellaneous Steel Shapes: Comply with ASTM A36.
- P. Sheet Metal Accessories: Same material and finish as deck members.
- Q. Flexible Closure Strips for Deck:
  1. Vulcanized, closed cell expanded chloroprene elastomer, complying with ASTM D1056, Grade SCE 41.
  2. Brittleness temperature: -40 DEGF, ASTM D746.
  3. Flammability resistance: Self-extinguishing.
  4. Install with adhesive in accordance with manufacturer's instructions.
    - a. Ensure complete closure.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Examine areas and conditions under which metal deck is to be installed for conditions detrimental to proper and timely completion of work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Do not start placement of metal deck until supporting work is in place and secured.
- D. Deck will be subject to rejection if metal deck:
  1. Units do not comply with requirements of SDI specifications and requirements herein.
  2. Is improperly manufactured, painted or installed.
  3. Is damaged so that strength is impaired.
  4. Is not installed as specified.

### **3.2 INSTALLATION**

- A. Install roof deck units and accessories as indicated, in accordance with SDI 31, manufacturer's recommendations, final approved Shop Drawings and as specified herein.
  1. Furnish manufacturer's standard accessories as needed to complete the deck installation.
- B. Locate deck bundles to prevent overloading of structure.

- C. Do not overload metal deck or supporting members:
  - 1. Contractor is solely responsible for safety, construction means, methods and sequencing of the Work.
  - 2. Until the entire assembly is complete, the structural elements may not be stable or capable of supporting code or stated design loads.
  - 3. Use care to assure deck construction loads are less than the recommendation of SDI 31, except where temporary shoring is installed.
- D. Place each deck unit on supporting structural frame, adjust to final position and accurately align with ends bearing on supporting members.
  - 1. Lap roof deck units at ends no less than 2 IN.
  - 2. Interlock units at sides without stretching, contracting, or deforming.
  - 3. Place deck units flat and square and secure to framing without warp or excessive deflection.
  - 4. Place units in accurate and close alignment for entire length of run and with close alignment of flutes of one unit with those of abutting unit.
- E. Plug weld sizes specified are effective fusion diameter of welds.
  - 1. Weld metal shall penetrate all layers of deck material and have good fusion to supporting members.
  - 2. Do not burn through deck.
- F. Prevent overtorquing of screw fasteners by using a tool with a depth limiting nosepiece and a clutch.
- G. Fastening of 1-1/2 IN Deep Metal Roof Deck:
  - 1. Unless otherwise specified, secure deck units to supporting frame and side laps as follows:
    - a. Fasten edge ribs of panels at each support.
    - b. At all interior supports and at ends of deck use:
      - 1) For 24 IN wide deck: Three, 5/8 IN round plug welds per deck unit.
      - 2) For 30 and 36 IN wide deck: Four, 5/8 IN round plug welds per deck unit.
      - 3) Install 22 GA deck with welding washers at weld locations.
    - c. At perimeter supports, use 5/8 IN round plug welds at 12 IN OC.
    - d. At side laps, use #12 hexhead screws at 18 IN OC
- H. Remove and replace deck which is structurally weak or unsound or which has burn holes due to improper welding or damage which Engineer declares defective.
- I. Cut and fit deck units and accessories around other work projecting through or adjacent to decking.
  - 1. Make cutting and fitting neat, square and trim.
    - a. Cut deck by mechanical means, not by burning.
  - 2. Neatly and accurately install reinforcing at all openings except:
    - a. Circular openings less than 6 IN DIA.
    - b. Rectangular openings having no side dimension greater than 6 IN.
  - 3. Reinforce openings that have not been framed between 6 and 12 IN with 20 GA flat steel sheet 12 IN greater in each dimension than opening.
    - a. Place sheet around opening and fusion weld to top surface of deck at each corner and midway along each side.
- J. Install insulation supports for support of roof insulation.
  - 1. Provide where top surface of roof deck does not occur adjacent to edge and openings as required to completely support roof insulation.
  - 2. Weld into position.
- K. Install metal closure strips at all open uncovered ends and edges of roof deck, and in voids between deck and other construction.
  - 1. Weld into position to provide a complete decking installation.
  - 2. Provide flexible closure strips instead of metal closures, at Contractor's option and when approved by Engineer wherever their use will ensure complete closure.

- a. Install with elastomeric type adhesive in accordance with written directions and recommendations of manufacturers of closure strips and adhesives.
- L. Ridge and Valley Plates:
  - 1. Weld ridge and valley plates to top surface of roof deck.
  - 2. Lap end joints not less than 3 IN with laps in direction of water flow.
- M. Roof Sump Pans:
  - 1. Place over openings in roof deck.
  - 2. Weld to top deck surface.
    - a. Space welds maximum 12 IN OC with at least one weld at each corner and each side midway between each corner.
  - 3. Cut opening in bottom of roof sump to accommodate drain size indicated.
- N. Cant Strips:
  - 1. Weld cant strips to top surface of roof deck at 12 IN OC.
  - 2. Lap end joints not less than 3 IN.
- O. Install metal accessories to close all openings and gaps between deck and other construction, at objects projecting through deck, at locations where deck changes direction, and at open ends of deck units where deck units terminate.
  - 1. Weld into position to provide a complete installation.
- P. Clean and Touch Up:
  - 1. Remove all surplus materials and debris from surface of deck after installation.
  - 2. Repair damaged galvanized surfaces in accordance with Specification Section 05 50 00 .

### 3.3 FIELD QUALITY CONTROL

- A. Remove and replace defective or damaged deck units.
- B. Special Inspection:
  - 1. See Specification Section 01 45 33.
  - 2. Special Inspection is required for:
    - a. Verification of proper deck and materials.
      - 1) Frequency: Prior to attaching deck.
    - b. Verification of proper weld filler materials, screws, powder actuated mechanical fasteners, weld testing and fastener spacing.
      - 1) Frequency: First 4 HRS during the first day of deck attachment and final inspection prior to covering work with concrete, insulation, or other materials.
    - c. Weld Testing:
      - 1) Make the following test in the presence of the Testing Agency employed on the project on the first deck panel to be installed :
        - a) Place one end of panel over a perimeter support and attach it only to that support with two welds as specified 6 IN apart.
        - b) Move the opposite end of the panel in plane parallel to the span of the panel until shear distress is noted in the weld.
        - c) Make the welds of sufficient quality to cause local distortions in the panel around the welds and show good perimeter contact between the welds and the panel.
        - d) When the results of this test are satisfactory and approved by the Testing Agency, install the remainder of the deck using the same weld rod size and type, amperage setting, and procedures used in the tested deck.
        - e) Weld Test procedure to be performed for each metal deck welder.
      - 2) Visually inspect the remainder of the welds.
        - a) When, in the opinion of the Testing Agency, any weld is of poor quality, provide an additional weld adjacent to the rejected weld.
        - b) Place the new weld on sound, unburned deck a sufficient distance away from the rejected weld.

**END OF SECTION**



## **SECTION 05 50 00 METAL FABRICATIONS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Custom fabricated metal items and certain manufactured units not otherwise indicated to be supplied under work of other Specification Sections.
  - 2. Design of all temporary bracing not indicated on Drawings.
  - 3. Design of systems and components, including but not limited to:
    - a. Ladders.
    - b. Modular framing system.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 03 09 00 - Concrete.
  - 4. Section 03 15 19 - Anchorage to Concrete.
  - 5. Section 09 91 10 - Architectural Paintint.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Aluminum Association (AA):
    - a. ADM 1, Aluminum Design Manual.
  - 2. American Association of State Highway and Transportation Officials (AASHTO):
    - a. HB, Standard Specifications for Highway Bridges.
  - 3. American Institute of Steel Construction (AISC):
    - a. 325, Manual of Steel Construction.
    - b. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
  - 4. The American Ladder Institute (ALI):
    - a. A14.3, Ladders - Fixed - Safety Requirements.
  - 5. American Society of Civil Engineers (ASCE):
    - a. 7, Minimum Design Loads for Buildings and Other Structures.
  - 6. ASTM International (ASTM):
    - a. A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
    - b. A36, Standard Specification for Carbon Structural Steel.
    - c. A47, Standard Specification for Ferritic Malleable Iron Castings.
    - d. A48, Standard Specification for Gray Iron Castings.
    - e. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - f. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
    - g. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - h. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - i. A197, Standard Specification for Cupola Malleable Iron.
    - j. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
    - k. A276, Standard Specification for Stainless Steel Bars and Shapes.
    - l. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

- m. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
  - n. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
  - o. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  - p. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
  - q. A536, Standard Specification for Ductile Iron Castings.
  - r. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
  - s. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
  - t. A563, Standard Specification for Carbon and Alloy Steel Nuts.
  - u. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
  - v. A668, Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
  - w. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
  - x. A786, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
  - y. A992, Standard Specification for Steel for Structural Shapes.
  - z. A1064, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
  - aa. A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
  - bb. B26, Standard Specification for Aluminum-Alloy Sand Castings.
  - cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - dd. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - ee. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
  - ff. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
  - gg. B632, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
  - hh. F436, Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
  - ii. F467, Standard Specification for Nonferrous Nuts for General Use.
  - jj. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
  - kk. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
  - ll. F835, Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws.
  - mm. F879, Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
  - nn. F1789, Standard Terminology for F16 Mechanical Fasteners.
  - oo. F3125, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
7. American Welding Society (AWS):
- a. A5.1/A5.1M, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
  - b. D1.1, Structural Welding Code - Steel.
  - c. D1.2, Structural Welding Code - Aluminum.
  - d. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
8. National Association of Architectural Metal Manufacturers (NAAMM):
- a. AMP 510, Metal Stairs Manual.
  - b. AMP 555, Code of Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron).

- c. MBG 531, Metal Bar Grating Manual.
- 9. NACE International (NACE).
- 10. Nickel Development Institute (NiDI):
  - a. Publication 11 007, Guidelines for the welded fabrication of nickel-containing stainless steels for corrosion resistant services.
- 11. Occupational Safety and Health Administration (OSHA):
  - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
- 12. Building code:
  - a. Florida Building Code, 2020 Edition including all amendments, referred to herein as Building Code.
  - b. A117.1, Accessible and Usable Buildings and Facilities.
- B. Qualifications:
  - 1. Qualify welding procedures and welding operators in accordance with AWS.
  - 2. Fabricator shall have minimum of 10 years experience in fabrication of metal items specified.
  - 3. Engineer for contractor-designed systems and components: Professional structural engineer licensed in the State of Florida.

### 1.3 DEFINITIONS

- A. Fasteners: As defined in ASTM F1789.
- B. Galvanizing: Hot-dip galvanizing per ASTM A123/A123M or ASTM A153/A153M with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.
- C. Hardware: As defined in ASTM A153/A153M.
- D. Installer or Applicator:
  - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  - 2. Installer and applicator are synonymous.

### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. Qualifications:
    - a. NACE inspector qualifications.
  - 2. Fabrication and/or layout drawings and details:
    - a. Submit drawings for all fabrications and assemblies.
      - 1) Include erection drawings, plans, sections, details and connection details.
    - b. Identify materials of construction, shop coatings and third party accessories.
  - 3. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Provide manufacturer's standard allowable load tables for the following:
      - 1) Grating and checkered plate.
      - 2) Castings, trench covers and accessories.
      - 3) Modular framing systems.
  - 4. Contractor designed systems and components:
    - a. Certification that manufactured units meet all design loads specified.
    - b. Shop Drawings and engineering design calculations:
      - 1) Indicate design live loads.
      - 2) Sealed by a licensed professional engineer, registered in the State of Florida.
      - 3) Engineer will review for general compliance with Contract Documents.
    - c. Contractor designed systems and components include the following:
      - 1) Ladders and associated landings.
      - 2) Gates.

- B. Informational Submittals:
  - 1. Certification of welders and welding processes.
    - a. Indicate compliance with AWS.
  - 2. NACE certification of surface preparation.
  - 3. NACE certification of paint application.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle fabrications to avoid damage.
- B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Headed studs and deformed bar anchors:
    - a. Nelson Stud Welding Div., TRW Inc.
    - b. Stud Welding Products, Inc.
  - 2. Mechanical anchor bolts:
    - a. See Section 03 15 19.
  - 3. Epoxy adhesive anchor bolts:
    - a. See Section 03 15 19.
  - 4. Concrete screw anchors:
    - a. See Section 03 15 19.
  - 5. Aluminum ladders:
    - a. Any manufacturer capable of meeting the requirements of this Specification Section.
  - 6. Galvanizing repair paint:
    - a. Clearco Products Co., Inc.
    - b. ZRC Products.
  - 7. Modular framing system:
    - a. Unistrut Building Systems.
    - b. B-Line Systems.
    - c. Kindorf.
    - d. Superstrut.
  - 8. Ladder safety extension post:
    - a. Bilco.

### 2.2 MATERIALS

- A. Steel:
  - 1. Structural:
    - a. W-shapes and WT-shapes: ASTM A992, Grade 50.
    - b. All other plates and rolled sections: ASTM A36.
  - 2. Pipe: ASTM A53, Types E or S, Grade B or ASTM A501.
  - 3. Structural tubing:
    - a. ASTM A500, Grade B (46 KSI minimum yield).
  - 4. Bolts, high strength:
    - a. ASTM F3125, Grade A325.
  - 5. Nuts, high strength:
    - a. ASTM A563.
  - 6. Washers (hardened):
    - a. ASTM F436.
    - b. Provide two (2) washers with all bolts.
  - 7. Bolts and nuts (unfinished):
    - a. ASTM A307, Grade A.

8. Welding electrodes: AWS D1.1, E70 Series.
9. Steel forgings: ASTM A668.
- B. Iron:
  1. Ductile iron: ASTM A536.
  2. Gray cast iron: ASTM A48 (minimum 30,000 PSI tensile strength).
  3. Malleable iron: ASTM A47, ASTM A197.
- C. Stainless Steel:
  1. Stainless steel in welded applications: Low carbon 'L' type.
  2. Minimum yield strength of 30,000 PSI and minimum tensile strength of 75,000 PSI.
    - a. Bars, shapes: ASTM A276, Type 304.
    - b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 304 or 316.
    - c. Strip, plate and flat bars: ASTM A666, Type 304 or 316.
    - d. Bolts and nuts: ASTM F593, Type 304 or 316.
  3. Minimum yield strength of 25,000 PSI and minimum tensile strength of 70,000 PSI.
    - a. Strip, plate and flat bar for welded connections, ASTM A666, Type 304L or 316L.
  4. Welding electrodes: In accordance with AWS for metal alloy being welded.
- D. Aluminum:
  1. Alloy 6061-T6, 32,000 PSI tensile yield strength minimum.
    - a. ASTM B221 and ASTM B308 for shapes including beams, channels, angles, tees and zeos.
    - b. Weir plates, baffles and deflector plates, ASTM B209.
  2. Alloy 6063-T5 or T6, 15,000 PSI tensile yield strength minimum.
    - a. ASTM B221 and ASTM B429 for bars, rods, wires, pipes and tubes.
  3. ASTM B26 for castings.
  4. ASTM F468, alloy 2024 T4 for bolts.
  5. ASTM F467, alloy 2024 T4 for nuts.
  6. Electrodes for welding aluminum: AWS D1.2, filler alloy 4043 or 5356.
- E. Washers: Same material and alloy as found in accompanying bolts and nuts.
- F. Embedded Anchor Bolts:
  1. See Specification Section 03 15 19.
- G. Mechanical Anchor Bolts and Adhesive Anchor Bolts:
  1. See Specification Section 03 15 19.
- H. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 PSI and a minimum tensile strength of 60,000 PSI.
- I. Deformed Bar Anchors: ASTM A1064 with a minimum yield strength of 70,000 PSI and a minimum tensile strength of 80,000 PSI.
- J. Iron and Steel Hardware: Galvanized in accordance with ASTM A153/A153M when required to be galvanized.
- K. Galvanizing Repair Paint:
  1. High zinc dust content paint for regalvanizing welds and abrasions.
  2. ASTM A780.
  3. Zinc content: Minimum 92 PCT in dry film.
  4. ZRC "ZRC Cold Galvanizing" or Clearco "High Performance Zinc Spray."
- L. Dissimilar Materials Protection: See Specification Section 09 91 10.

## 2.3 MANUFACTURED UNITS

- A. Ladders:
  1. General:
    - a. Fully welded type.
      - 1) All welds to be full penetration welds, unless otherwise specified.

- b. All ladders of a particular material shall have consistent construction and material shapes and sizes unless noted otherwise on the Drawings.
  - c. Design ladder in accordance with OSHA Standards, ANSI A14.3, ASCE 7 and applicable Building Codes.
  - d. Ladders shall be designed to support a minimum concentrated live load of 300 LBS at any point to produce the maximum stress in the member being designed.
    - 1) Apply additional 300 LB loads for each section of ladder exceeding 10 FT.
  - e. Maximum allowable stresses per AA ADM 1.
  - f. Maximum lateral deflection: Side rail span/240 when lateral load of 100 LBS is applied at any location.
2. Material:
- a. Aluminum.
  - b. Finish:
    - 1) Mill.
3. Rails:
- a. Round pipe or rectangular tubing:
    - 1) Round pipe:
      - a) 1-1/2 IN nominal diameter.
      - b) Schedule 80.
    - 2) Rectangular tubing:
      - a) Cross-section: 3 by 2 IN maximum.
      - b) Thickness: 0.125 IN minimum.
  - b. Spacing:
    - 1) Minimum clear distance between rails to be 18 IN.
    - 2) Step-through ladder extensions: 24 IN, centerline to centerline.
  - c. Provide cap at exposed top and bottom of side rails.
    - 1) Provide weep holes as necessary to prevent the accumulation of moisture within hollow members.
  - d. Extend side rails of step-through ladders a minimum of 42 IN above the landing.
4. Rungs:
- a. Minimum 1 IN DIA or 1 IN square solid bar.
    - 1) Integral non-slip finish on all sides.
      - a) Non-slip finish: Coarse knurling or extruded serrations.
      - b) Shop or field-applied grit tape and cap type non-slip finishes are not acceptable.
  - b. Rungs shall penetrate inside wall of side rails.
    - 1) Do not extend rungs beyond the outside face of the side rail.
    - 2) Provide fillet weld all around rung at inside face of side rail and plug weld at outside face of side rail.
  - c. Rung spacing:
    - 1) Uniform, 12 IN.
    - 2) Top rung shall be level with landing or platform.
      - a) Where top of ladder terminates at grating cover, floor access door, roof hatch or similar condition; locate top rung as close as practicable to, but not more than 6 IN below, adjacent walking surface.
    - 3) Spacing of bottom rung from grade or platform may vary but shall not exceed 14 IN.
5. Brackets:
- a. Angle or bent plate brackets welded to side rails:
    - 1) 3/8 IN by 2-1/2 IN by length required.
    - 2) Provide punched holes for 3/4 IN bolts or anchors.
    - 3) Minimum distance from centerline of rung to wall or any obstruction: 7 IN.
    - 4) Maximum spacing: 4 FT OC.
  - b. For floor supported ladders, provide 3/8 by 2-1/2 by 4 IN rectangular bracket or 3/8 by 6 by 6 IN square plate welded to rails with punched holes for 3/4 IN bolts.
    - 1) Provide wall brackets on floor supported units if vertical run is over 4 FT.
6. Provide ladder cage where shown on the Drawings or required by OSHA.

- a. Cage construction shall meet all requirements of OSHA Standards and this Specification Section:
  - 1) Hoops: Minimum 1/4 by 2 IN bar at 48 IN OC spacing.
  - 2) Vertical bars: Minimum 1/4 by 1-1/2 IN bar.
  - 3) Weld all connections.
  - 4) Construct cage of same materials as the ladder on which it is mounted.
  - 5) Mount cage on ladder by welding.
7. Landings:
  - a. Construct landing, railing and all supports of same material as the ladder.
  - b. Design live load for landing platform and supporting structure:
    - 1) 100 PSF, uniform load.
    - 2) 300 LBS concentrated load on 4 IN square area.
    - 3) All components to be adequate for the uniform load or the concentrated load, whichever requires the stronger component.
    - 4) Maximum deflection: 1/300 of span under a superimposed live load of 100 PSF.
  - c. Grating:
    - 1) Per this Specification Section.
  - d. Structural support: Channel or tubular sections with bracing, plates, angles, etc., to support guardrail and grating and to support landing from the side of the building wall.
    - 1) Weld or bolt all connections using stainless steelbolts, nuts and washers.
  - e. Guardrails:
    - 1) Match ladder side rails.
      - a) Space intermediate rails equally between top rail and top of kickplate.
    - 2) Provide 4 IN high x 3/8 IN thick toeboard each side of landing.
8. Gates:
  - a. Constructed of same material and sizes as the railing system.
  - b. Hinges:
    - 1) Stainless steel.
    - 2) Heavy-duty, self-closing.
  - c. Gate stop:
    - 1) Aluminum.
9. Ladder safety extension post:
  - a. Telescoping tubular aluminum or stainless steel section that automatically locks into place when fully extended.
  - b. Non-ferrous corrosion-resistant spring and hardware.
  - c. Factory assembled with all hardware necessary for mounting to ladder.
  - d. Bilco "LadderUp" safety post.
10. Deflector plate:
  - a. For aluminum ladders: Minimum 0.0625 IN aluminum plate, ASTM B209.
  - b. For stainless steel ladders: Minimum 0.0625 IN stainless steel plate, ASTM A666.
  - c. For steel ladders: Minimum 0.0625 IN steel plate, ASTM A6.
  - d. Profile as shown on Drawings.
  - e. Fabricate to shapes and sizes required to meet OSHA Standards.
- B. Bollards:
  1. 8 IN DIA extra strength steel pipe, ASTM A53.
    - a. Galvanized.
    - b. See Specification Section 09 91 10 for painting requirements.
- C. Loose Lintels:
  1. Steel, ASTM A36 or ASTM A572 Grade 50, sizes as indicated on Drawings.
  2. Hot-dip galvanized per ASTM A123/A123M.
- D. Modular Framing System:
  1. Materials:
    - a. Steel: ASTM A1011, stainless steel, Grade 33.
      - 1) Hot-dipped galvanized, ASTM A123 or ASTM A153.

- b. Aluminum: ASTM B221 or ASTM B209.
  - c. Stainless steel: ASTM A666.
- 2. Channels and inserts:
  - a. Steel or stainless steel: Minimum 12 GA.
  - b. Aluminum: Minimum 0.080 IN.
  - c. Channels to have one side with a continuous slot with in-turned lips.
    - 1) Width: 1-5/8 IN.
    - 2) Depth and configuration as necessary for loading conditions.
- 3. Fittings: Same material as system major components.
- 4. Fasteners:
  - a. Nuts: Toothed grooves in top of nuts to engage the in-turned lips of channel.
  - b. Bolts: Hex-head cap screws.
  - c. Same material as system major components.
- 5. End caps:
  - a. At each exposed end of each piece mounted on walls, or guardrails, or suspended from framing 7 FT or less above the floor or platform.
    - a) Plastic for all exposed ends 7 FT or more above floor or platform.
    - b) Plastic or metallic for all other exposed ends.
- 6. Schedule:
  - a. Exterior areas: Aluminum.
  - b. All other areas not listed above: Hot-dipped galvanized steel.
- 7. Provide dissimilar materials protection in accordance with Specification Section 09 91 10.
- 8. Repair all cut ends or otherwise damaged areas of galvanized steel in accordance with ASTM A780.

## 2.4 FABRICATION

- A. Verify field conditions and dimensions prior to fabrication.
- B. Form materials to shapes indicated with straight lines, true angles, and smooth curves.
  - 1. Grind smooth all rough welds and sharp edges.
    - a. Round all corners to approximately 1/32 - 1/16 IN nominal radius.
- C. Provide drilled or punched holes with smooth edges.
  - 1. Punch or drill for field connections and for attachment of work by other trades.
- D. Weld Shop Connections:
  - 1. Welds to be continuous fillet type unless indicated otherwise.
  - 2. Full penetration butt weld at bends in stair stringers and ladder side rails.
  - 3. Weld structural steel in accordance with AWS D1.1 using Series E70 electrodes conforming to AWS A5.1/A5.1M.
  - 4. Weld aluminum in accordance with AWS D1.2.
  - 5. Weld stainless steel in accordance with AWS D1.6 .
    - a. Treat all welded areas in accordance with ASTM A380.
  - 6. All headed studs to be welded using automatically timed stud welding equipment.
  - 7. Grind smooth welds that will be exposed.
- E. Conceal fastenings where practicable.
- F. Fabricate work in shop in as large assemblies as is practicable.
- G. Tolerances:
  - 1. Rolling:
    - a. ASTM A6.
    - b. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness, or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating and mechanical straightening, subject to the limitations of the AISC Specification.
  - 2. Fabrication tolerance:
    - a. Member length:



- 1) Both ends finished for contact bearing: 1/32 IN.
  - 2) Framed members:
    - a) 30 FT or less: 1/16 IN.
    - b) Over 30 FT: 1/8 IN.
  - b. Member straightness:
    - 1) Compression members: 1/1000 of axial length between points laterally supported.
    - 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
  - c. Specified member camber (except compression members):
    - 1) 50 FT or less: -0/+1/2 IN.
    - 2) Over 50 FT: -0/+1/2 IN (+1/8 IN per 10 FT over 50 FT).
    - 3) Members received from mill with 75 PCT of specified camber require no further cambering.
    - 4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
    - 5) Camber shall be measured in fabrication shop in unstressed condition.
  - d. At bolted splices, depth deviation shall be taken up by filler plates.
    - 1) At welded joints, adjust weld profile to conform to variation in depth.
    - 2) Slope weld surface per AWS requirements.
  - e. Finished members shall be free from twists, bends and open joints.
    - 1) Sharp kinks, bends and deviation from above tolerances are cause for rejection of material.
- H. Fabricate ladders and accessories using aluminum unless shown otherwise on Drawings.
1. Finish:
    - a. Mill, unless noted otherwise.
    - b. Coat surfaces in contact with dissimilar materials.
      - 1) See Specification Section 09 91 10.
- I. See Specification Section 09 91 10 for preparation and painting of ferrous metals and other surfaces.

## 2.5 SOURCE QUALITY CONTROL

- A. Surface Preparation:
1. Refer to Specification Section 09 91 10 for surface preparation requirements.
  2. All miscellaneous metal fabrication item surfaces shall be inspected and approved by NACE certified coatings inspector prior to application of shop-applied coatings.
    - a. Inspection shall be performed to determine depth of blast profile and cleanliness of surface.
    - b. Fabricator shall reblast and or re-clean surfaces as required until acceptable.
- B. Shop Applied Coating Application:
1. Refer to Specification Section 09 91 10 for coating requirements.
  2. After surface has been accepted in writing by NACE certified coatings inspector, fabricator may proceed with application of coatings.
  3. Application of coatings shall be observed and certified by NACE certified coatings inspector.
- C. Shop Inspection and Testing:
1. Owner will employ and pay for the services of a qualified independent testing agency to inspect and test all structural steel work for compliance with Contract Documents.
  2. Contractor responsible for testing to qualify shop and field welders and as needed for Contractor's own quality control to ensure compliance with Contract Documents.
  3. Independent testing agency shall have a minimum of five years performing similar work and shall be subject to Owner's approval.
- D. Responsibilities of Testing Agency:
1. Inspect shop and field welding in accordance with AWS Code including the following non-destructive testing:
    - a. Visually inspect all welds.

- b. In addition to visual inspection, test 50 PCT of full penetration welds and 20 PCT of fillet welds with liquid dye penetrant or mag particle.
  - c. Test 20 PCT of liquid dye penetrant tested full penetration welds with ultrasonic or radiographic testing.
- 2. Inspect high-strength bolting in accordance with the RCSC Specification for Structural Joints Using High-Strength Bolts, Section 9.
  - a. Verify direct tension indicator gaps, if applicable.
- 3. Inspect structural steel which has been erected.
- 4. Inspect stud welding in accordance with AWS Code.
- 5. Prepare and submit inspection and test reports to Engineer.
  - a. Assist Engineer to determine corrective measures necessary for defective work.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Provide items to be built into other construction in time to allow their installation.
  - 1. If such items are not provided in time for installation, cut in and install.
- B. Prior to installation, inspect and verify condition of substrate.
- C. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.
  - 1. Field welding aluminum is not permitted unless approved in writing by Engineer.

### **3.2 INSTALLATION**

- A. Set metal work level, true to line, plumb.
  - 1. Shim and grout as necessary.
- B. Contractor is solely responsible for safety.
  - 1. Construction means and methods and sequencing of work is the prerogative of the Contractor.
  - 2. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete; e.g., until slabs, decks, and diagonal bracing or rigid connections are installed.
  - 3. Partially complete structural members shall not be loaded without an investigation by the Contractor.
  - 4. Until all elements of the permanent structure and lateral bracing system are complete, temporary bracing for the partially complete structure will be required.
- C. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including construction activities and operation of equipment is the responsibility of the Contractor.
  - 1. Plumb, align, and set structural steel members to specified tolerances.
  - 2. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are made, the succeeding work is in place, and temporary work is no longer necessary.
  - 3. Use temporary guys, bracing, shoring, and other work to prevent injury or damage to adjacent work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.
  - 4. Contractor shall be responsible for the design of the temporary bracing system and must consider the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed work, including work of all other trades.
    - a. If not obvious from experience or from the Drawings, confer with the Engineer to identify those structural steel elements that must be complete before the temporary bracing system is removed.
  - 5. Remove and dispose of all temporary work and facilities off-site.

- D. Examine work-in-place on which specified work is in any way dependent to ensure that conditions are satisfactory for the installation of the work.
  - 1. Report defects in work-in-place which may influence satisfactory completion of the work.
  - 2. Absence of such notification will be construed as acceptance of work-in-place.
- E. Field Measurement:
  - 1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.
  - 2. Contractor responsible for the accurate fit of the work.
- F. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection.
  - 1. Use surveyor's level.
  - 2. Notify Engineer of any errors or deviations found by such checking.
- G. Framing member location tolerances after erection shall not exceed the frame tolerances listed in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.
- H. Erect plumb and level; introduce temporary bracing required to support erection loads.
- I. Use light drifting necessary to draw holes together.
  - 1. Drifting to match unfair holes is not allowed.
- J. Welding:
  - 1. Conform to AWS D1.1 and requirements of the FABRICATION Article in PART 2 of this Specification Section.
  - 2. When joining two sections of steel of different ASTM designations, welding techniques shall be in accordance with a qualified AWS D1.1 procedure.
- K. Shore existing members when unbolting of common connections is required.
  - 1. Use new bolts for rebolting connections.
- L. Clean stored material of all foreign matter accumulated prior to the completion of erection.
- M. Bolt Field Connections: Where practicable, conceal fastenings.
- N. Field Welding:
  - 1. Follow AWS procedures.
  - 2. Grind welds smooth where field welding is required.
- O. Field cutting grating or checkered plate to correct fabrication errors is not acceptable.
  - 1. Replace entire section.
- P. Remove all burrs and radius all sharp edges and corners of miscellaneous plates, angles, framing system elements, etc.
- Q. Unless noted or specified otherwise:
  - 1. Connect steel members to steel members with 3/4 IN DIA ASTM F3125, Grade A325 high strength bolts.
  - 2. Connect aluminum to aluminum with 3/4 IN DIA stainless bolts.
  - 3. Connect aluminum to structural steel using 3/4 IN DIA stainless steel bolts.
    - a. Provide dissimilar metals protection.
  - 4. Connect aluminum and steel members to concrete and masonry using stainless steel mechanical anchor bolts or adhesive anchor bolts unless shown otherwise.
    - a. Provide dissimilar materials protection.
  - 5. Provide washers for all bolted connections.
  - 6. Where exposed, bolts shall extend a maximum of 3/4 IN and a minimum of 1/2 IN above the top of installed nut.
    - a. If bolts are cut off to required maximum height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nuts.
- R. Install and tighten ASTM F3125, Grade A325 high-strength bolts in accordance with the AISC 325, Allowable Stress Design (ASD).

1. Provide hardened washers for all Grade A325 bolts.
  - a. Provide the hardened washer under the element (nut or bolt head) turned in tightening.
- S. After bolts are tightened, upset threads of ASTM A307 bolts or anchor bolts to prevent nuts from backing off.
- T. Secure metal to wood with lag screws of adequate size with appropriate washers.
- U. Do not field splice fabricated items unless said items exceed standard shipping length or change of direction requires splicing.
  1. Provide full penetration welded splices where continuity is required.
- V. Provide each fabricated item complete with attachment devices as indicated or required to install.
- W. Anchor such that work will not be distorted nor fasteners overstressed from expansion and contraction.
- X. Set beam and column base plates accurately on nonshrink grout as indicated on Drawings.
  1. See Division 03 Specification Sections for non-shrink grout and anchorage.
  2. Set and anchor each base plate to proper line and elevation.
    - a. Use metal wedges, shims, or setting nuts for leveling and plumbing columns and beams.
      - 1) Wedges, shims and setting nuts to be of same metal as base plate they support.
      - 2) Tighten nuts on anchor bolts.
    - b. Fill space between bearing surface and bottom of base plate with nonshrink grout.
      - 1) Fill space until voids are completely filled and base plates are fully bedded on wedges, shims, and grout.
    - c. Do not remove wedges or shims.
      - 1) Where they protrude, cut off flush with edge of base plate.
    - d. Fill sleeves around anchor bolts solid with non-shrink grout.
- Y. Tie anchor bolts in position to embedded reinforcing steel using wire.
  1. Tack welding prohibited.
    - a. Coat projecting bolt threads and nuts with heavy coat of clean grease.
  2. Anchor bolt location tolerance:
    - a. Per Section 03 15 19.
- Z. Install bollards as detailed on Drawings.
  1. Fill pipe with concrete and round off at top.
- AA. Coat aluminum surfaces in contact with dissimilar materials in accordance with Specification Section 09 91 10.
- BB. Repair damaged galvanized surfaces in accordance with ASTM A780.
  1. Prepare damaged surfaces by abrasive blasting or power sanding.
  2. Apply galvanizing repair paint to minimum 6 mils DFT in accordance with manufacturer's instructions.
- CC. Anchor ladder to concrete structure with minimum 3/4 IN stainless steel anchor bolts with minimum 6 IN embedment.
- DD. Anchor ladder to masonry structure with minimum 3/4 IN stainless steel anchor bolts with minimum 6 IN embedment.
  1. When anchoring into masonry, fill masonry cores with grout at anchor locations and each masonry core within 8 IN of anchor
  2. When anchoring into cavity wall construction, provide minimum 6 IN embedment into concrete or masonry back-up wall.
    - a. At each anchor location, provide sleeve between back face of veneer and cavity face of concrete or masonry back-up wall.
    - b. Cut cavity insulation as required and seal around sleeve.
      - 1) Sleeve to be 1 IN DIA schedule 40 stainless steel tubing, TP-304L, ASTM A269.

- a) Minimum wall thickness to be .065 IN.
- 2) Continuously weld 4 by 4 by 1/4 IN Type 304 stainless steel, ASTM A666 flange onto each end of pipe.
  - a) Drill 1 IN hole in flange to match pipe.
  - b) Attach sleeve to concrete or masonry back-up with 1/4 IN concrete screw anchors.
- 3) Grout solid, area around bolt where bolt penetrates veneer.
- 4) Accurately locate sleeves to align with bolt locations on ladder.

EE. Anchor ladder to metal stud walls using minimum 1/2 IN stainless steel bolts, nuts and washers.

1. Verify that stud wall has been provided with adequate backing to accept ladder anchors.

FF. Install ladder safety extension post in accordance with manufacturer's instructions.

1. Mount device opposite the climbing side.
2. Provide ladder safety extension device for all ladders unless noted otherwise.

### 3.3 FIELD QUALITY CONTROL

A. Tolerances (unless otherwise noted on the Drawings):

1. Frame placement, after assembly and before welding or tightening.
  - a. Deviation from plumb, level and alignment: 1 IN 500, maximum.
  - b. Displacement of centerlines of columns: 1/2 IN maximum, each side of centerline location shown on Drawings.
  - c. Displacement of centerlines of columns: 1/2 IN maximum, each side of centerline location shown on Drawings.

B. OWNER Pays for Field Inspection and Testing:

1. Owner will employ and pay for services of an independent testing agency to inspect and test structural steel shop and field work for compliance with this Specification Section.
2. Contractor provides sufficient notification and access so inspection and testing can be accomplished.
3. Contractor pays for retesting of failed tests and for additional testing required when defects are discovered.

### 3.4 CLEANING

- A. After fabrication, erection, installation or application, clean all miscellaneous metal fabrication surfaces of all dirt, weld slag and other foreign matter.
- B. Provide surface acceptable to receive field applied paint coatings specified in Specification Section 09 91 10.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.



## DIVISION 06

WOOD, PLASTICS, AND COMPOSITES

THIS PAGE INTENTIONALLY LEFT BLANK.



## **SECTION 06 10 00 ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Rough Carpentry, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Wood Council (AWC):
    - a. NDS, National Design Specification for Wood Construction.
  - 2. The Engineered Wood Association (APA):
    - a. PRP-108, Performance Standards and Qualification Policy for Structural Use Panels.
    - b. U450, Storage and Handling of APA Trademarked Panels.
    - c. Y510, Plywood Design Specification.
  - 3. ASTM International (ASTM):
    - a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - b. D2898, Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
    - c. D4442, Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
    - d. D4444, Standard Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters.
    - e. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 4. American National Standards Institute/Single Ply Roofing Industry (ANSI/SPRI):
    - a. ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roof Systems.
  - 5. Environmental Protection Agency (EPA).
  - 6. FM Global (FM):
    - a. 1-49, Property Loss Prevention Data Sheets - Perimeter Flashing.
  - 7. National Institute of Standards and Technology (NIST):
    - a. PS 1, Quantitative NMR (Benzoic Acid).
    - b. PS 20, American Softwood Lumber Standard.
  - 8. Underwriters Laboratories, Inc. (UL):
    - a. 723, Standard for Test for Surface Burning Characteristics of Building Materials.
  - 9. Building code shall be the latest edition.
- B. Qualifications:
  - 1. Wood Treatment Plant: AWWA M3.
  - 2. Treated Wood Inspection: AWWA M2.
- C. Miscellaneous:
  - 1. Factory marking:
    - a. Lumber:
      - 1) Identify type, grade, moisture content, inspection service, producing mill, and other qualities specified.
      - 2) Marking may be omitted, as allowed by Building Code, if certificate of inspection is provided for each shipment.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Fabrication drawings of all fabricated items.
3. Product technical data including:
  - a. Acknowledgement that products submitted meet requirements of standards referenced.
  - b. Manufacturer's installation instructions for all products specified.
4. Certifications:
  - a. Chemicals used in treatment process are registered with and approved by EPA.
  - b. Moisture content of material prior to treatment: 25 PCT maximum.
  - c. Material has been kiln-dried after treatment (KDAT) to the moisture content specified.
5. Documentation of treatment of treated material in accordance with standards referenced.

#### **1.4 DELIVERY AND STORAGE**

- A. Delivery, storage and handling of untreated wood products:
  1. Lumber: As recommended by the grading agency indicated on the grade stamp.
  2. Plywood: APA U450.
- B. Delivery, storage, handling and disposal of treated wood products: AWP4 M4.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

#### **2.2 MATERIALS**

- A. General:
  1. Lumber (for framing, blocking, nailers, furring, grounds and similar members):
    - a. NIST PS 20.
    - b. Species:
      - 1) Treated material: As indicated in the appropriate AWP4 standard.
      - a) Provide species of FRTM as necessary to achieve UL rating listed.
    - c. Grade:
      - 1) For nominal sizes up to and including 2 x 4: Standard and better.
      - 2) For nominal sizes up to 2 IN thick and wider than 4 IN: #2 and better.
  2. Non-structural plywood:
    - a. NIST PS 1.
    - b. C-D plugged:
      - 1) Exposure: EXP1
      - 2) Thickness: As indicated on Drawings.
      - 3) Touch sanded.
- B. Preservative Treated Material:
  1. Moisture content:
    - a. Prior to treatment: 25 PCT.
    - b. Kiln-dry after treatment (KDAT), ASTM D4442 and ASTM D4444:
      - 1) Lumber: 19 PCT maximum.
      - 2) Plywood: 18 PCT maximum.
  2. Preservative:
    - a. Waterborne: AWP4 P5.
    - b. As indicated in the appropriate AWP4 standard.
  3. Pressure-treat material in accordance with AWP4 U1.
  4. Wherever practicable, material to be treated shall be manufactured in its final form prior to treatment.

- C. Fire-Retardant Treated Material (FRTM):
  - 1. Acceptable manufacturer:
    - a. Hoover Treated Wood Products, Inc.:
      - 1) Interior: "Pyro-Guard".
      - 2) Exterior: "Exterior Fire-X".
  - 2. Maximum moisture content:
    - a. Prior to treatment: 25 PCT.
    - b. Kiln-dry after treatment (KDAT), ASTM D4442 and ASTM D4444:
      - 1) Lumber: 19 PCT (KDAT).
      - 2) Plywood: 15 PCT (KD-15).
  - 3. Fire-retardant preservative:
    - a. Provide protection against decay:
      - 1) EPA registered for use as a wood preservative.
    - b. Shall not bleed-through or adversely affect bond of any finish.
  - 4. Pressure-treat material in accordance with AWPA U1.
  - 5. UL Classified:
    - a. FR-S, UL 723.
    - b. Exterior: No increase in classification when subjected to the Standard Rain Test, ASTM D2898.
    - c. Provide UL mark on each piece of FRTM.
  - 6. Maximum flame spread rating: 25, ASTM E84.
  - 7. Wherever practicable, material to be treated shall be manufactured in its final form prior to treatment.
- D. Fasteners and Anchors:
  - 1. Nails and screws:
    - a. Dry, non-corrosive exposure: Hot dipped galvanized or Type 304 stainless steel.
    - b. Wet, corrosive, marine, and/or below grade: Type 316 stainless steel.
  - 2. Adhesive anchors, expansion anchors, self-tapping concrete anchors, bolts, nuts, and washers: See Specification Section 03 15 19.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Verify measurements, dimensions, and shop drawing details before proceeding.
- B. Coordinate location of studs, nailers, blocking, grounds and similar supports for attached work.
- C. Eliminate sharp projections which would puncture roofing, flashing or underlayment material.

### **3.2 ERECTION AND INSTALLATION**

- A. General:
  - 1. Provide preservative treated material for all wood used:
    - a. Outside building.
    - b. Below grade.
  - 2. Provide fire-retardant treated material for all wood used:
    - a. Inside building.
    - b. Exterior building walls.
    - c. Roof construction.
    - d. Parapet walls.
    - e. Roofing nailers.
- B. Attach work securely by anchoring and fastening as indicated or required to support applied loading.
  - 1. Anchor wood to concrete using adhesive or expansion anchors as specified in Specification Section 03 15 19.
    - a. Separate wood from direct contact to concrete with polyethylene foam gasket strip.

- 1) Size: 1/4 IN by width of wood member.
- 2) Owens Corning "SillSealR".
2. Anchor wood to metal using bolts and nuts as specified in Specification Section 03 15 19.
3. Provide flat washers under all bolt heads and nuts.
4. Fasten plywood in accordance with APA recommendations.
5. Use fasteners of size that will not penetrate members where opposite side will be exposed to view or receive finish materials.
6. Install fasteners without splitting of wood; predrill as required.
7. Do not drive threaded friction type fasteners.
8. Tighten bolts and lag screws at installation and retighten as required.
- C. Set work to required levels and lines, plumb, true.
  1. Shim as required.
  2. Cut and fit accurately.
- D. Provide wood grounds, nailers, or blocking where required for attachment of other work and surface applied items.
  1. Form to shapes indicated or required.
    - a. FRTM lumber:
      - 1) Do not rip or mill.
      - 2) Cross-cutting and drilling are allowable in accordance with manufacturer's recommendations and UL requirements.
      - 3) Resurfacing, planing or fabrication of special shapes or profiles shall be done prior to treatment.
    - b. FRTM plywood:
      - 1) Cross-cutting, ripping and drilling are allowable in accordance with manufacturer's recommendations and UL requirements.
    - c. Light sanding of FRTM as permitted by UL to remove raised grain or prepare for finishing is allowable.
    - d. Field treat cuts and holes in preservative treated material in accordance with AWP A M4 and manufacturer's published recommendations.
  2. Grounds:
    - a. Dressed, key beveled lumber minimum 1-1/2 IN wide of thickness required to bring face of ground even with finish material.
    - b. Remove temporary grounds when no longer required.
  3. Install roofing nailers as necessary for attachment of flashing, curbs, fascia, coping, and related accessories:
    - a. Match height of nailers to insulation.
    - b. Anchor nailers to resist force of 300 PLF unless required otherwise by FM Global or roofing manufacturer.
      - 1) Metal decking attachment:
        - a) Attach base nailer to metal roof deck using self-tapping stainless steel sheet metal screws (STSMS) with plate washers or with minimum 3/8 IN Type 304 stainless steel hex head bolts with nuts and washers.
        - b) Countersink heads of bolts flush with top of nailer.
      - 2) Concrete decking attachment:
        - a) Attach base nailer to concrete roof deck using minimum 3/8 IN stainless steel adhesive anchors with minimum 3 IN embedment.
        - b) Countersink heads of bolts flush with top of nailer.
      - 3) Provide size and spacing of anchorage as required to meet loading criteria specified.
        - a) Fasten blocking for perimeter flashing in accordance with ANSI/SPRI ES-1 and FM Global 1-49.
    - c. Provide 1/2 IN vent spaces between lengths of nailers.
    - d. Install nailers over vapor retarder.

- E. When wood has been exposed to moisture allow to completely dry out prior to covering with additional wood or another material.
- F. Correct or replace wood which shows bowing, warping or twisting to provide a straight, plumb and level substrate for applications of other materials.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.



# DIVISION 07

## THERMAL AND MOISTURE PROTECTION

THIS PAGE INTENTIONALLY LEFT BLANK.



## **SECTION 07 21 00 BUILDING INSULATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Building Insulation in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. C272/C272M, Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions
    - b. C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
    - c. C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
    - d. C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
    - e. C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
    - f. D1621, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
    - g. E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials.
  - 2. Underwriters Laboratories, Inc. (UL):
    - a. Building Materials Directory.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Manufacturer's recommendations on sealants, tapes and mastics.
- B. Informational Submittals:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Certification from insulation manufacturer stating that insulation proposed is acceptable for intended use per the Drawings.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Rigid extruded polystyrene board insulation:
    - a. Dow.
    - b. DiversiFoam Products.
    - c. Owens Corning.
  - 2. Blanket or batt thermal insulation:
    - a. Owens Corning.

- b. USG Corporation.
    - c. CertainTeed.
  - 3. Sound control insulation:
    - a. ROCKWOOL Group.
    - b. Thermafiber by Owens Corning.
  - 4. Vapor retarder:
    - a. Raven Industries, Inc.
    - b. Reef Industries, Inc.
    - c. Fortifiber Building Systems Group, Inc by Henry Company.
    - d. Alumiseal.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

## 2.2 MATERIALS

- A. General:
  - 1. Foam plastic insulation used in buildings and structures shall comply with the requirements of the Building Code.
    - a. Surface burning characteristics: ASTM E84.
    - b. Flame spread index: Maximum 75.
    - c. Smoke developed: Maximum 450.
- B. Rigid Polystyrene Board Insulation:
  - 1. Extruded: ASTM C578, Type IV.
    - a. Water vapor transmission: ASTM E96/E96M, 1.1 perm-IN maximum.
    - b. Water absorption: ASTM C272/C272M, 0.3 PCT maximum.
    - c. Thermal resistance: ASTM C518 at 75 DEGF mean temperature, 5.0/IN.
  - 2. Provide insulation designed for intended use.
    - a. Perimeter insulation and protection board.
      - 1) Similar to Dow "Styrofoam PERIMATE."
      - 2) Compressive strength: ASTM D1621, 30 PSI.
      - 3) Thickness:
        - a) Perimeter insulation: as indicated on drawings
        - b) Protection board: as indicated on drawings
      - 4) Edges:
        - a) Long edge: Shiplap.
        - b) Short edge: Square.
- C. Sealant and Mastic (for setting polystyrene and/or polyisocyanurate insulation board):  
Manufacturer's recommended standard.
- D. Blanket or Batt Thermal Insulation:
  - 1. Glass or other inorganic fibers and resinous binders formed into flexible blankets or semi-rigid sheets.
  - 2. Unfaced:
    - a. ASTM C665, Type 1.
  - 3. Minimum thickness as noted on Drawings.
- E. Sound Control Insulation:
  - 1. Mineral wool batts.
    - a. ASTM C665, Type I.
    - b. UL listed when used in fire rated construction.
  - 2. Formaldehyde free.
  - 3. Density: Minimum 2.5 PCF.
  - 4. Sound Reduction, ASTM C423.
    - a. Minimum NRC for 3 IN thick material: 1.05.
  - 5. Thickness: As noted on Drawings.
  - 6. Thermafiber "SAFB".

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. General:
  - 1. Insulate full thickness over surfaces to be insulated.
  - 2. Fit tightly around obstructions, fill voids.
  - 3. Cover all penetrations (electrical junction boxes, switch boxes, piping, conduits, etc.) with insulation, taking care not to compromise the workings of the device.
  - 4. Fit butted joints of batt or blanket insulations tightly together.
  - 5. Apply single or double layer to achieve total thickness.
    - a. If double layer is provided, stagger all joints minimum 12 IN.
  - 6. Do not use broken or torn pieces of insulation.
  - 7. Install so that completed installation is vapor tight.
    - a. Seal all joints.
    - b. Seal to abutting materials to maintain vapor retarder integrity.
    - c. Provide manufacturer's recommended vapor retarder tape for use with faced batt insulation or separate vapor retarder.
      - 1) If vapor retarder tape fails to adhere to any surface, apply sprayed-on adhesive as recommended by tape manufacturer to promote adhesion.
    - d. Provide manufacturer's recommended solvent-free sealant compatible with insulation board for rigid board insulation.
      - 1) Tape is not acceptable for use with rigid board insulation.
- C. Blanket or Batt Insulation using Separate Vapor Retarder Sheet in Exterior Stud Wall Systems:
  - 1. Verify that all piping, conduit, electrical box and other in-wall work is complete prior to installing insulation and vapor retarder.
  - 2. Install insulation friction fit between studs.
  - 3. Tightly butt ends.
  - 4. Install vapor retarder to warm side of building exterior wall.
    - a. Completely seal each wall area to surrounding construction.
  - 5. Install vapor retarder vertically.
    - a. Use widest practical sheet.
    - b. Install in continuous sheets, floor to structure above, without horizontal joints.
    - c. Fold flaps of vapor retarder over studs.
    - d. Tape flaps together continuously.
    - e. Tape bottom and top edges to structure continuously.
    - f. After installation of any additional conduit, boxes, piping or other items within wall system, repair all tears or penetrations of vapor retarder with vapor retarder tape prior to installation of gypsum board.
- D. Rigid Board Polystyrene Insulation on Exterior Walls:
  - 1. Install insulation on interior surfaces of exterior walls.
  - 2. Install continuously without interruption in single layer. install between wall furring strips. Cut to fit tightly to furring member. Set solidly in mastic.
  - 3. Make all joints tight.
  - 4. Cut and fit insulation at corners, and at penetrations, connections, etc.
  - 5. Seal all joints with sealant applied continuously to edges of pieces before installation or apply sealant bead continuously to joint after installation.
  - 6. Cover penetrations or connections which remain exposed after insulation is in place and seal with expanding foam sealant for a distance of 6 IN on each side.
  - 7. If no covering is indicated on Drawings, cover entire exposed surface with 1/2 IN thick gypsum board.
  - 8. Provide support for gypsum board at minimum 24 IN OC.
- E. Sound Control Insulation:
  - 1. Install friction fit between studs.

2. Do not obstruct ventilation spaces.
3. Fill all miscellaneous voids unless noted otherwise on Drawings.
4. After installation of conduit, boxes, piping or other items within wall system, reposition displaced insulation and fill all voids.

### **3.2 FIELD QUALITY CONTROL**

- A. Repair or replace damaged insulation and/or vapor retarder as directed by Engineer.
- B. Provide minimum cover of 5/8 IN type X gypsum wallboard over exposed foam surfaces.

**END OF SECTION**

**SECTION 07 26 00  
UNDER SLAB VAPOR RETARDER**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Under slab vapor retarder.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Concrete Institute (ACI):
    - a. 302.2R, Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
  - 2. ASTM International (ASTM):
    - a. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
    - b. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
    - c. E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials.
    - d. E1643, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
    - e. E1745, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Product data sheet on vapor retarder sheet and vapor retarder tape.
    - c. All accessories proposed for use.
    - d. Manufacturer's installation instructions.
- B. Samples:
  - 1. Provide two, 6 IN x 6 IN samples of vapor retarder material taped together using the vapor retarder tape proposed.
  - 2. Provide two samples of all accessories proposed for use.
- C. Informational Submittals: Manufacturer's recommendation on vapor retarder tape.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Vapor retarder:
    - a. Fortifiber Building Systems Group, Inc. by Henry Company.
    - b. Layfield Group, Ltd.
    - c. Raven Industries, Inc.
    - d. Reef Industries, Inc.

- e. Stego Industries, LLC.
- f. W.R. Meadows, Inc.

B. Submit request for substitution in accordance with Specification Section 01 25 13.

## **2.2 PERFORMANCE REQUIREMENTS**

- A. Vapor Retarder:
- 1. ASTM E1745, Class A.
  - 2. Thickness: Minimum 15 MIL.
  - 3. Water vapor permeance: 0.03 maximum per ASTM E96/E96M.
  - 4. Puncture resistance: ASTM D1709, Method B, 2200 grams.
  - 5. Minimum tensile strength: 45 LBS/IN, ASTM D882.

## **2.3 ACCESSORIES**

- A. Pipe Boots: Manufacturer's standard boot fabricated to maintain the integrity of the vapor retarder system.
- B. Vapor Retarder Tape: As recommended by vapor retarder manufacturers.

# **PART 3 - EXECUTION**

## **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions, ASTM E1643 and ACI 302.2R.
- B. Provide vapor retarder where indicated on the Drawings.
- 1. Place continuous vapor retarder above granular fill subgrade material, unless noted otherwise.
- C. Lap minimum 6 IN and seal in accordance with ASTM E1643 and manufacturer's recommendations.
- D. Extend to extremities of area and seal to adjacent elements.
- E. Seal all penetrations: Provide pipe boot for all pipes or conduit penetrating the floor slab.

## **3.2 FIELD QUALITY CONTROL**

- A. Ensure proper precautions are implemented to prevent damage to installed vapor retarder membrane prior to and during pouring of concrete floor slab.
- B. Inspect vapor retarder immediately prior to placement of concrete.
- 1. Patch all punctures, tears, holes, etc.
    - a. Repair with additional layer of vapor retarder and seal entire patch with vapor retarder tape or as recommended by manufacturer.
    - b. Lap all repairs minimum 6 IN.

**END OF SECTION**

**SECTION 07 54 19**  
**PVC MEMBRANE ROOFING - FULLY ADHERED**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Roof insulation.
  - 2. Membrane roofing, cover board, and base flashings.
  - 3. Vapor retarder.
  - 4. Insulated curbs for roof penetrations of ductwork or piping.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Section 06 10 00 - Rough Carpentry.
  - 2. Section 07 62 00 - Sheet Metal Flashing and Trim.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - b. C642, Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
    - c. C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
    - d. D395, Standard Test Methods for Rubber Property - Compression Set.
    - e. D573, Standard Test Method for Rubber - Deterioration in an Air Oven.
    - f. D638, Standard Test Method for Tensile Properties of Plastics.
    - g. D746, Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
    - h. D4434, Standard Specification for Poly (Vinyl Chloride) Sheet Roofing.
    - i. D5147, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
    - j. D6294, Standard Test Method for Corrosion Resistance of Ferrous Metal Fastener Assemblies Used in Roofing and Waterproofing.
    - k. E96, Standard Test Methods for Water Vapor Transmission of Materials.
  - 2. FM Global (FM):
    - a. Approval Standard 4470, Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction.
    - b. 4470, Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction.
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. 790, Standard for Standard Test Methods for Fire Tests of Roof Coverings.
- B. Qualifications:
  - 1. Manufacturer shall have a minimum of 10 years continuous recent experience in the manufacture of membrane roofing systems similar to system specified.
    - a. Manufacturer to have similar systems in place that meet or exceed warranty length as specified.
  - 2. Applicator factory trained and approved in writing by roofing manufacturer.
  - 3. Applicator shall have a minimum of 10 years of experience installing membrane roofing systems similar to system specified.
    - a. Minimum of five years of the 10 years of experience shall have been spent installing roof systems manufactured by company proposed for use.

- b. Applicator shall have minimum of five years installation experience using heat welded seaming equipment and testing of heat welded seams for seam integrity.
- 4. Manufacturer's Technical Field Representative shall have minimum 10 years of experience in field installation and applicator training and approval process.

### 1.3 DEFINITIONS

- A. Installer or Applicator:
  - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  - 2. Installer and applicator are synonymous.

### 1.4 SYSTEM DESCRIPTION

- A. Fully adhered single-ply roofing system over metal deck, including but not limited to:
  - 1. Vapor retarder.
  - 2. Roof insulation.
  - 3. Cover board.
  - 4. Single-ply reinforced PVC membrane.
  - 5. Flashings, expansion joints, penetrations and/or other materials necessary for a complete installation.
  - 6. Walkway protection.

### 1.5 SUBMITTALS

- A. Shop Drawings:
  - 1. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
  - 2. Fabrication and/or layout drawings:
    - a. Computer generated, scaled outline of roof areas for all buildings showing:
      - 1) Slopes and tapered roof insulation layout.
        - a) Provide tapered insulation Shop Drawing illustrating installation patterns and dimensions for each tapered module.
      - 2) Walkway protection layout.
      - 3) Edge details.
      - 4) Penetrations and details.
        - a) Identify each penetration.
      - 5) Mechanical fastener locations.
      - 6) Any special conditions.
      - 7) Seam locations.
    - b. Minimum plan scale: 1/8 inches = 1 foot.
    - c. Minimum detail scale: 1-1/2 inches = 1 foot.
    - d. Manufacturer's complete installation drawings, including details.
    - e. If manufacturer's standard detail drawings are used as part of the Submittal information, the standard details shall be enhanced to show the actual project conditions of the substrate including insulation, cover board, vapor retarder, decking material, wall construction, parapet construction and height and coping condition.
- B. Maintenance Information:
- C. Informational Submittals:
  - 1. Certifications prior to installation:
    - a. Certification of manufacturer's qualifications.
    - b. Certification of applicator's qualifications and letter from manufacturer acknowledging applicator as a factory trained and manufacturer's approved applicator with the minimum number of years experience installing products specified per this Specification Section.
    - c. Certification of manufacturer's Technical Field Representative qualifications.
    - d. Letter from roofing manufacturer and insulation manufacturer stating that roof insulation being used is compatible with roofing system and will perform properly for intended use.



- e. Letter from adhesive manufacturer and insulation manufacturer stating that adhesive being used is compatible with all products and will perform properly for intended use.
- f. Copy of report identifying the location(s) of all seam failures and repairs made to that seam per the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.
- g. Copy of punch list generated by manufacturer's technical field representative during final inspection of roofing, flashing and welded seams.
- h. Copy of Pre-Installation Conference meeting minutes.
- 2. Certifications for final close-out:
  - a. Written report prepared by manufacturer's Technical Field Representative stating that roof has been inspected for deficiencies, a listing of all deficiencies and corrections that have been made, and roofing system has been properly installed and is warrantable for period required by this Specification Section.
  - b. Final Warranty documents signed by manufacturer's authorized representative.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Store membrane rolls lying down on pallets and fully protected from the weather with clean canvas tarpaulins.
  - 1. Unvented polyethylene tarpaulins are not acceptable.
- C. Store adhesives at temperatures recommended by manufacturer.
- D. Replace all materials that become damaged during storage prior to installation.
  - 1. Remove damaged material from the Site.
- E. Protect insulation from direct exposure to sunlight.

## 1.7 WARRANTY

- A. Manufacturer's 10 year system warranty.
  - 1. Warranty to cover roofing membrane, insulation, and roofing manufacturer provided accessories.
  - 2. Warranty to cover manufacturer's authorized applicator workmanship applied to the roof membrane identified in the preceding paragraph.
  - 3. Warranty period to commence on date of Owner's acceptance of the building.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. PVC roofing membrane:
    - a. Sika Sarnafil, Inc.
    - b. I.B. Systems.
  - 2. Insulation:
    - a. Sika Sarnafil, Inc.
    - b. Atlas Building Products.
    - c. Hunter Panels.
    - d. I.B. Systems.
  - 3. Vapor retarder:
    - a. Sika Sarnafil, Inc.
    - b. I.B. Systems.
  - 4. Other materials:
    - a. Manufacturers as noted.

## 2.2 SYSTEM COMPONENTS

### A. Membrane:

1. Reinforced PVC (polyvinyl chloride) sheet with lacquer coating.
  - a. Meet requirements of ASTM D4434, Type II, Grade 1.
  - b. Thickness:
    - 1) 0.060 inches.
    - 2) Sheet width to be determined by manufacturer.
    - 3) Provide widest sheet possible.
    - 4) ASTM  $\pm$  tolerance for membrane thickness is not acceptable.
      - a) Provide certification of specified mil thickness.
  - c. Color:
    - 1) White.
    - 2) Reflectivity: 0.83.
    - 3) Emissivity: 0.92.
    - 4) Solar reflective index (SRI): Greater than 104.
2. Physical properties:
  - a. Tensile strength, minimum psi: ASTM D638, 1600.
  - b. Elongation at break, minimum: ASTM D638, 270% machine by 250% transverse.
  - c. Seam strength, minimum (percent of tensile strength): ASTM D638, 80.

### B. Insulation:

1. Rigid, HCFC free, isocyanurate foam insulation boards with approved faces for adhered membrane application.
  - a. Size:
    - 1) 4 feet x 4 feet with 2 inches thick base layer at roof drain locations and scupper openings unless noted otherwise on the Drawings.
    - 2) 4 feet x 8 inches boards acceptable on mechanically attached applications.
  - b. Total thickness as indicated on the Drawings.
  - c. ASTM C1289, Class 1, Type II, faced rigid cellular polyisocyanurate.
  - d. Density: 2 pcf.
  - e. Compressive strength: 25 psi.
  - f. Board edges: Square.
  - g. Thermal value: R value (long term thermal resistance) minimum 6.2.
  - h. Moisture vapor transmission: Less than 1.0 perm.
  - i. Tapered insulation: Same material as base layer of insulation tapered to provide 1/4 inches per foot of slope.

### C. Vapor Retarder:

1. Self-adhered multi-ply reinforced sheet.
  - a. SBS modified bitumen with high-density polyethylene grid laminated between two layers of polyethylene film.
  - b. Thickness: 32 mil minimum.
  - c. Water vapor permeance: ASTM E96, maximum 0.10 perms.
  - d. Breaking strength, MD/XD: ASTM D5147, 64/88 pound/IN.

### D. Cover Board:

1. Thickness:
  - a. 1/4 inches.
  - b. Size: 4 x 4 feet or 4 x 8 feet.
2. Non-structural glass mat faced, water resistant, non-combustible silicone treated gypsum core panel approved for use as a substrate under fully adhered PVC roofing membranes.
  - a. Top surface shall be pre-primed to enhance adhesion.
3. Georgia Pacific Corp. "Dens-Deck Prime."

### E. Adhesives:

1. Proper type as required for substrate and service being adhered.
2. Only solvent base adhesives are acceptable.

3. Provide primers as required for all adhesives.
- F. Vent Pipe Flashing, Sealants, Prefabricated Inside and Outside Flashing Corners, Termination Bars and Batten Strips:
  1. Provide manufacturer's standard premolded, prefabricated PVC product that best suits the condition encountered.
  2. Provide aluminum termination bars.
    - a. Size: 2-1/4 inches deep by 0.10 inches thick extruded bar with predrilled holes at 8 inches on-center.
  3. Batten strips:
    - a. Minimum 14 GA channel shaped steel bar, galvanized, ASTM A653.
    - b. Fastener holes predrilled prior to galvanizing process.
- G. Miscellaneous Fasteners and Anchors: Provide all miscellaneous fasteners and anchors as required for a free draining, water and air tight roofing system.
- H. Wood Blocking and Nailers: See Specification Section 06 10 00.
- I. Fasteners:
  1. Ferrous components:
    - a. Test in accordance with ASTM D6294.
    - b. Meet or exceed FM 4470.
  2. Provide stainless steel for all exposed fasteners.

## 2.3 ACCESSORIES

- A. Sheet metal fabrications, including but not limited to coping, fascia, scuppers and downspouts and counterflashing.
  1. See Specification Section 07 62 00.
- B. Walkway Protection:
  1. Weldable, polyester reinforced PVC membrane.
    - a. Minimum thickness: 96 mils.
    - b. Color: Light gray.
  2. Minimum 39 inches wide.
  3. Embossed surface.
- C. Pipe, Duct and Conduit Supports:
  1. 100% recycled rubber.
    - a. Density: ASTM C642, minimum 0.50 oz/CUIN.
    - b. Compressive deformation:
      - 1) ASTM D395.
      - 2) 5% at 70 psi and 72 degrees F.
    - c. Brittleness at low temperature: ASTM D746, -50 degrees F.
    - d. Weathering: ASTM D573, 70 hours at 120 degrees F.
  2. Uniform load capacity: 500 pound per lineal FT.
  3. Size:
    - a. Width: 6 inches.
    - b. Length and height as necessary for item being supported.
  4. Compatible with modular framing.
  5. Provide modular framing, pipe supports, pipe clamps or other accessories as necessary for items being supported.
    - a. See Specification Section 40 05 07 and Specification Section 26 05 00 as applicable.
  6. Similar to Cooper B-Line "DURA-BLOK."

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Pre-Installation Conference:

1. The applicator, roofing manufacturer's Technical Installation Representative, Owner's Representative, Engineers Site Representative(s), Architect and Attend a pre-installation conference.
  2. The meeting shall discuss all aspects of the Project including but not limited to:
    - a. Safety.
    - b. Setup.
    - c. Schedule.
    - d. Material storage and handling.
    - e. Replacement of unacceptable materials prior to and during installation and disposal of unacceptable materials.
- B. Applicator to verify that area to be roofed is free of ice/snow, water, dirt, incompatible materials, sharp objects, and miscellaneous debris that may damage the membrane or the vapor retarder.

### 3.2 INSTALLATION

- A. Install all materials in accordance with manufacturer's written instructions.
- B. Manufacturer's installation procedures take precedence over this Specification Section.
- C. Provide wood nailers and blocking as necessary for a complete installation.
- D. Vapor Retarder:
1. Install over metal decking or concrete decking as applicable using adhesive recommended by the manufacturer.
  2. Cut around roof penetrations and seal vapor tight.
  3. Extend vapor retarder up face of parapet wall to top of roof insulation.
  4. Lap side joints minimum 4 inches, lap end joints minimum of 6 inches and seal all laps with adhesive then tape raw edge of lap.
  5. Repair all damage, tears, holes, and nicks in accordance with vapor retarder manufacturer's recommendations.
    - a. Verify compatibility of adhesive with vapor retarder patching method and materials.
  6. Do not piece vapor retarder together using scraps.
- E. Installation of Insulation:
1. Cut insulation neatly to fit around all roof penetrations, projections, and changes in thickness of concrete topping.
  2. Before installation is started, remove trash, debris, grease, oil, water, moisture and contaminants from substrate to receive insulation.
    - a. Prepare all surfaces according to applicable Specification Sections.
  3. Bottom layer of insulation shall be installed with all joints tightly butted and end joints staggered 12 inches minimum.
    - a. Additional layers shall be installed over preceding layers with all joints tightly butted and end joints staggered 12 inches minimum.
  4. Attach insulation using adhesive in accordance with manufacturer's recommendations for uplift rating specified.
  5. Provide tapered insulation where shown on the Drawings or where required.
  6. Provide crickets behind all roof penetrations larger than 12 inches.
  7. Do not install boards that have been damaged and/or broken into pieces unless the area to be insulated requires a smaller piece.
    - a. Trim damaged boards prior to use to provide straight edges and square corners.
- F. Provide roofing manufacturer's recommended sleeper at all duct support structures, condensing units or similar equipment.
1. Fasten sleeper to deck as necessary to resist uplift.
  2. Flash sleeper to roof membrane as recommended by roofing manufacturer.
- G. Installation of Cover Board:
1. Lay cover board over top of insulation tightly butted and cut to fit around all penetrations.
    - a. Stagger end joints 12 inches minimum.

2. Attach cover board using adhesive in accordance with manufacturer's recommendations for uplift rating required.
  3. Seal around all penetrations with sealant acceptable to insulation and roof membrane manufacturer.
  4. Do not install boards that have been broken into pieces smaller than 4 feet x 4 feet unless the area to be covered requires a smaller piece.
    - a. Trim damaged boards prior to use to provide straight edges and square corners.
- H. Installation of Roofing:
1. Install roof membrane and flashing using adhesives recommended by roofing manufacturer.
  2. Extend roofing to face of parapet wall and secure.
  3. Extend flashing up parapet wall and terminate in recessed reglet.
    - a. Install flashing up parapet wall over top of wood blocking on top of parapet wall and down opposite face to bottom of wood blocking unless noted otherwise.
    - b. Provide in one piece with no horizontal joints.
    - c. Extend flashing onto roof surface as required by manufacturer.
  4. Install flashing at all vertical surfaces, roof interruptions and penetrations.
    - a. Flash all roof penetrations in accordance with roofing manufacturer's standard details unless indicated otherwise on the Drawings.
  5. Heat weld and test all seams the same day they are laid.
  6. Install walkway protection where indicated.
    - a. Heat weld into place.
    - b. Use only full width pieces of walkway protection cut to fit.
      - 1) Torn or otherwise damaged sections of walkway protection will not be accepted.
    - c. Provide breaks in walkway protection to avoid ponding of water on sloped portions of roofing.

### 3.3 FIELD QUALITY CONTROL

- A. Provide for manufacturer's Technical Field Representative time during Pre-Installation Conference, job start-up, and every two weeks, with a minimum of two site visits during roofing application.
  1. Manufacturer's Technical Field Representative shall inspect all roofing, flashing, and spot test welded seams at completion, generate punch list and provide copy of punch list to Engineer.
  2. Include all applicable costs.
- B. Protect installed insulation from water using water cut-offs in bad weather and at end of work period.
- C. Remove and replace wet and/or damaged insulation and cover board.
- D. On-site quality reviews of all welded seams shall be performed by Applicator prior to stopping work each day:
  1. Provide subsequent report identifying the location(s) of all seam failures and repairs made to that seam.
    - a. Manufacturer's guidelines shall be followed and all protocol shall be maintained if a seam fails the quality review.

**END OF SECTION**

## SECTION 07 54 25 FULLY ADHERED TPO ROOFING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Furnish labor, materials, tools, equipment, and services for Fully Adhered TPO Roofing in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### 1.2 QUALITY ASSURANCE

- A. Miami-Dade Notice of Approval
- B. Manufacturer authorized roofing installer.
- C. Component products made by single manufacturer or approved for use with warranted system.
- D. ASTM International (ASTM):
  - 1. ASTM C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
  - 2. ASTM C1303 Standard Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation.
  - 3. ASTM D6878 .
- E. American National Standards Institute (ANSI) / Single Ply Roofing Industry (SPRI):
  - 1. ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems
- F. National Roofing Contractors Association (NRCA):
  - 1. Roofing and Waterproofing Manual
- G. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
  - 1. Architectural Sheet Metal Manual.
- H. Underwriters Laboratories (UL):
  - 1. UL 790, Standard for Tests for Fire Resistance of Roof Covering Materials.
- I. Concrete Moisture Vapor Testing:
  - 1. Coordinate maximum moisture allowed in concrete deck with roofing manufacturer.
  - 2. Test concrete decks for moisture in accordance with Section 07 16 04.
  - 3. If moisture content exceeds manufacturer's recommendation, install moisture control system per Section 07 16 05.
- J. Fire Resistance Rating:
  - 1. UL 790, Class A.
  - 2. Assembly in conformance with fireproofing as specified.

#### 1.3 SUBMITTALS

- A. Shop Drawings:
  - 1. Roof layout showing insulation thicknesses and details.
  - 2. Indicate location of expansion joints, crickets, saddles, curbs, walkways, safety tie backs, vents, drains and other penetrations.
  - 3. Indicate slope direction, slope amount, and key vertical elevation points.
  - 4. Profiles of flashing assemblies.
  - 5. Installation Drawings.
- B. Product Data:

1. Manufacturer standard literature for vapor barrier, insulation and roofing system components, including adhesives and accessories indicating compliance with specification requirements.
  2. Manufacturer standard literature for roof coping system indicating components and accessories including anchor plate configuration.
- C. Samples:
1. Roofing manufacturer's facsimile of each sheet metal color for pre-selection.
  2. 3 IN x 5 IN 75 MM x 125 MMsamples of roofing manufacturer's sheet metal color for final approval.
- D. Project Information:
1. Minutes from Preinstallation Conference.
- E. Contract Closeout Information:
1. Warranty.
  2. Maintenance Data:
    - a. See Section 01 78 23.

#### 1.4 WARRANTY

- A. Fifteen (15) year warranty of weathertightness signed by roofing materials manufacturer.
1. Warranty to include coverage for peak gusts of wind to:
    - a. 55 MPH 80 kphat 33 FT 10 M above ground.
  2. Warranty to include the entire system: membrane flashings, adhesives, sealants, counterflashings, insulation, fasteners, fastener plates, fastener strips, hard rubber or metal edging, metal termination bars, sheet metal copings and edge metal, and other material authorized by manufacturer.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Fully Adhered TPO Roofing:
1. Base:
    - a. Carlisle SynTec
  2. Optional:
    - a. Firestone Building Products
    - b. GAF
    - c. Johns Manville
- B. Sheathing:
1. Base:
    - a. Georgia-Pacific.
  2. Optional:
    - a. Same as Membrane Manufacturer.
    - b. USG Corporation.
    - c. National Gypsum.
- C. Vapor Retarder (VR):
1. Base:
    - a. Same as Membrane Manufacturer.
- D. Walkways and Pavers:
1. Base:
    - a. Same as Membrane Manufacturer.
- E. Other Materials:
1. Manufacturers as noted.
- F. Other manufacturers desiring approval comply with Section 00 26 00.

## 2.2 DESIGN CRITERIA

- A. Determine per Wind Load Design Guide for Low Sloped Flexible Membrane Roofing Systems published by SPRI.
- B. Design roof system and anchorage fastener type and spacing needed to resist uplift pressures including roof covering and metal edge securement to meet design loads and satisfy requirements of applicable building codes, local amendments, and ANSI/SPRI ES-1.
- C. Wind loads: Use the greater of the following:
  - 1. Wind pressures as required per local building code based on wind speed, exposure factor and importance factor noted in Structural Drawings.
  - 2. Wind pressures defined by Florida Building Code.
- D. Requirements applicable to designated warranty.
- E. Roof height and parapet height: As indicated.
- F. Static pressure on building interior: < 0.5 IN 12.7 MM H<sub>2</sub>O (125 Pa) water.

## 2.3 MATERIALS

- A. Sheathing:
  - 1. Install over steel deck or existing roofing materials.
  - 2. Moisture resistant gypsum core with fiberglass mat and non-asphaltic surfacing.
  - 3. Minimum Thickness: 5/8 IN.
  - 4. DensDeck Prime Roof Board by Georgia-Pacific.
- B. Vapor Retarder:
  - 1. Rubberized asphalt membrane adhered to polyethylene or polyolefin top sheet.
  - 2. 30 MIL 0.76 MM thick, minimum.
  - 3. Vapor Permeance: Not exceeding 0.05 Perm 2.86 ng/s/m<sup>2</sup>/Pa.
  - 4. UV protected for 90 day exposure.
  - 5. Primer or adhesive as recommended for substrate by manufacturer.
  - 6. Base: Carlisle 725TR.
- C. Roof Insulation:
  - 1. Furnished by roofing manufacturer.
  - 2. UL listed for assembly indicated.
  - 3. Provide crickets and saddles as required.
  - 4. Polyisocyanurate (PISO) roof insulation:
    - a. Rigid, closed cell foam core bonded to heavy-duty glass fiber mat facers.
    - b. ASTM C1289 Type II, Class 1.
    - c. R-value: 5.6 per inch in accordance with ASTM C1303, CAN/ULC S770.
    - d. Compressive strength: 25 PSI minimum per ASTM D1621, Grade 3.
    - e. Dimensional stability: 2 PCT maximum linear change in seven days per ASTM D2126.
    - f. Minimum insulation thickness: as indicated on the drawings
      - 1) Areas where tapered insulation is indicated:
        - a) Taper to provide slope of 1/4 IN per FT.
      - 2) Areas with uniform insulation thickness (sloped structures): as indicated on the drawings.
- D. Cover Board:
  - 1. Moisture resistant gypsum core with fiberglass mat and non-asphaltic surfacing.
  - 2. Minimum Thickness: 5/8 IN.
  - 3. DensDeck Prime Roof Board by Georgia-Pacific.
- E. TPO Roofing Membrane:
  - 1. Material: Thermoplastic Polyolefin (TPO) single-ply roofing membrane.
    - a. Fire Retardant.
    - b. Polyester fabric reinforced.



2. Color: White.
3. Thickness: 60 MIL thick.
4. Minimum Physical Properties:
  - a. Thickness over scrim: 15 MIL 0.38 MM by ASTM D4637.
  - b. Tearing Strength: 55 LBS 24.9 kgMIN by ASTM D751.
  - c. Breaking Strength: 225 LBS 102 kgMIN by ASTM D751.
  - d. Heat Aging: retain 90 PCT of original Breaking Strength and Elongation values.
  - e. Weather Resistance: 10,080 kJ/m2 by ASTM G155.
5. Base Product: SureWeld by Carlisle SynTec.
- F. Membrane flashings, fasteners, adhesives, tapes, cements and sealants:
  1. Roofing manufacturer's standard.
- G. TPO Walkway Roll:
  1. Manufacturer's standard walkway roll stock, designed to protect TPO roof membrane.
    - a. Slip-resistant surface.
  2. Nominal Thickness: 160 MIL 4 MM.
  3. Size: 34 IN x 50 FT 860 MM x 15.25 M roll.
  4. Secure to roof membrane by heat welding.
  5. Discontinue walkway at roof membrane seams.
  6. Color:
    - a. To be selected from manufacturers standard colors by Architect.
  7. Base Product: Sure-Weld Walkway Roll by Carlisle SynTec.
- H. Nailing Strips:
  1. As detailed and required.
- I. Pipe Flashings:
  1. Provide for each pipe penetration; include clamps, adhesive and sealants.
- J. Underlayment for Pavers:
  1. As recommended by roofing manufacturer.
- K. Adhesives, Cleaners, and Primers:
  1. As recommended by roofing manufacturer.
- L. Fire-Retardant Treated (FRT) Wood Blocking:
  1. See Section 06 10 53.
- M. Other Materials as required by manufacturer for complete system warranty.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Inspect entire area to be roofed for acceptability.
- B. Ensure substrate for insulation or roofing membrane is clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges and foreign materials.
- C. Correct unsatisfactory conditions.
- D. Commencement of roofing activities constitutes acceptance of all conditions affecting installation and roofing system performance.

### **3.2 INSTALLATION**

- A. Sheathing:
  1. Install per UL requirements.
  2. Lay sheathing tightly butted and cut to fit around penetrations.
  3. Attach sheathing to deck in accordance with roofing manufacturer's recommendations.

**B. Vapor Retarder:**

1. Install in largest practical widths.
2. Bond vapor retarder to substrate using approved adhesive.
3. Install continuously.
  - a. Ensure surfaces to be taped are clean and dry.
  - b. Ensure that no discontinuities occur, including at seams, penetrations, and edge terminations.
  - c. Join sections of vapor retarder and lap seams in direction of water flow.
  - d. Continuously seal roof vapor retarder to wall air and moisture retarder.
4. Seal around pipes, conduits, curbs, safety tie-backs, and other penetrations with pipe boots in accordance with manufacturer's instructions.
5. Maintain continuity of vapor retarder over expansion joints.
6. Repair holes in vapor retarder with method and material recommended by manufacturer.
7. Protect vapor retarder from damage until covered with insulation.

**C. Wood Nailers:**

1. Design to resist a minimum of 200 LBS/LF in any direction per SPRI Test Method RE-1.
2. Provide where indicated or required for proper securement of roofing system.
3. Install top of blocking flush with top of insulation.

**D. Insulation:**

1. Where required thickness of insulation is greater than 2 IN 50 MM: Install insulation in at least 2 layers.
2. Stagger board joints in successive layers laterally and longitudinally.
3. Butt joints tightly.
4. Cut insulation neatly to fit around roof penetrations and projections.
5. Secure insulation with approved adhesive.

**E. Membrane:**

1. Unroll and position membrane without stretching.
  - a. Allow membrane to relax prior to bonding.
2. Position sheets to accommodate contours of roof deck.
3. Apply bonding adhesive in accordance with the manufacturer's instructions, to exposed underside of the membrane and the corresponding substrate area.
4. Protect membrane from stains/discoloring caused by adhesives.
5. Membrane Splices:
  - a. Hot air weld TPO membrane sheets using Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.
  - b. Locate field splices away from low areas and drain sumps.
  - c. Shingle field splices to avoid bucking water.
  - d. Probe seams once the hot air welds have thoroughly cooled.
  - e. Repair seam deficiencies same day they are discovered.
  - f. Apply sealant of type recommended by membrane manufacturer on cut edges of reinforced membrane where scrim reinforcement is exposed after seam probing is complete.
6. Secure membrane along the perimeter of each roof level, roof section, curb, skylight, penthouse, and other penetrations as recommended by membrane manufacturer.
7. Flashing:
  - a. Follow manufacturer's typical flashing procedures for wall, curb, and penetration flashing including metal edging/coping and roof drain applications.
  - b. Flashing of parapets, curbs, expansion joints and other parts of roof must be performed using reinforced TPO membrane.
  - c. Manufacturer's standard, non-reinforced TPO membrane can be used for flashing pipe penetrations, sealant pockets, scuppers, as well as inside and outside corners when use of pre-fabricated accessories is not feasible.
  - d. Terminate base-of-wall flashings in accordance with manufacturer's approved details.
  - e. Pre-flashing at sheet metal parapet copings:

- 1) Extend TPO membrane, flashing or both over top of parapet prior to capping with sheet metal.
- f. Expansion Joints:
  - 1) Extend TPO membrane across roofing expansion joints.
  - 2) Include adequate slack in membrane to accommodate anticipated movement.
8. Hot or Cold Weather Procedures:
  - a. Comply with manufacturer's instructions.

### 3.3 INSTALLATION – WALKWAYS

- A. Install walkways at traffic concentration points, such as roof hatches, access doors, rooftop ladders, or locations as indicated.
- B. Do not locate within 10 FT 3 M of roof edge.
- C. Clean surfaces to be bonded.
- D. Secure by heat welding as recommended by membrane manufacturer.

### 3.4 PROTECTION

- A. When completion of flashings and terminations is not achieved by end of work day, seal system to temporarily prevent water infiltration.
- B. Remove temporary water cutoffs prior to proceeding with Work.
- C. Remove and replace wet insulation.

### 3.5 SCHEDULE OF ROOF SYSTEMS

- A. Roof System 1 – Fully Adhered TPO over Steel Deck:
  1. Gypsum Sheathing.
  2. Insulation.
  3. Cover Board.
  4. TPO Membrane.

**END OF SECTION**

## **SECTION 07 62 00 FLASHING AND SHEET METAL**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Flashing and Sheet Metal, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

#### **1.3 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Architectural Manufacturers Association (AAMA):
    - a. 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
  - 2. American National Standards Institute/Single Ply Roofing Industry (ANSI/SPRI):
    - a. ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roof Systems.
  - 3. ASTM International (ASTM):
    - a. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
    - b. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
    - c. B32, Standard Specification for Solder Metal.
    - d. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 4. FM Global (FM).
  - 5. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
    - a. Architectural Sheet Metal Manual.
- B. Qualifications:
  - 1. Sheet metal fabricator shall have minimum 10 years experience in fabrication of sheet metal items similar to items specified.
  - 2. Sheet metal installer shall have minimum five years experience installing sheet metal items specified.

#### **1.4 DEFINITIONS**

- A. Installer or Applicator:
  - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  - 2. Installer and applicator are synonymous.
- B. PVDF: Polyvinylidene fluoride.

#### **1.5 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
  - 3. Fabrication and/or layout drawings.
    - a. Scaled drawing showing expansion joint locations, special conditions, profile, fastening and jointing details.

- 1) Minimum plan scale: 1/8 IN = 1 FT.
  - 2) Minimum detail scale: 1-1/2 IN = 1 FT.
  4. Fabricator qualifications.
  5. Installer qualifications.
- B. Samples:
1. Finish and color samples for each product specified for Engineer preliminary color selection.
- C. Informational Submittals:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  2. Warranty: Manufacturer's sample warranty language.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Pre-finished sheet metal:
    - a. Carlisle SynTec Systems.
    - b. Firestone Building Products Company.
    - c. Petersen Aluminum Corporation.
  2. Butyl sealant:
    - a. Pecora Corporation.
    - b. Sika.
    - c. Tremco Commercial Sealants & Waterproofing.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

### **2.2 MATERIALS**

- A. Sheet Metal:
1. Aluminum: ASTM B209.
  2. Galvanized Steel: ASTM A653/A653M.
  3. Stainless Steel: ASTM A666.
    - a. Type 304 [316] [316L].
- B. Fasteners: Non-ferrous compatible with sheet metal.
- C. Sealants:
1. Non-curing Butyl Sealant:
    - a. Pecora "BA-98".
    - b. Sika "SikaLastomer 511".
    - c. Tremco "TremPro JS-773".
  2. Building sealants:
    - a. See Specification Section 07 92 00.
- D. Fasteners: Non-ferrous compatible with sheet metal.
- E. Retainer Clips and Continuous Cleats: Galvanized steel or stainless steel.
- F. Solder: ASTM B32.
- G. Dissimilar Metal Protection: Comply with Specification Section 09 96 00.
- H. Reglets: See Specification Section 04 05 23.

### **2.3 MANUFACTURED ITEMS**

1. Factory fabricated accessories, including but not limited to:
  - a. Scuppers and spill-outs.
  - b. All accessories to be factory mitered and welded.

- c. All accessories to be factory mitered and welded.
- 2. Profile:
  - a. Metal-Era "Perma-Tite Tapered."
  - b. Front leg: 6 IN.
  - c. Back leg: 5 IN.
- B. Finish:
  - 1. PVDF coating with minimum 70 PCT resin content.
    - a. Meet requirements of AAMA 2605.
      - 1) Color: to match existing thru-wall scupper colors

## 2.4 FABRICATED ITEMS

- A. General:
  - 1. Shop fabricate items to maximum extent possible.
    - a. Fabricate true and sharp to profiles and sizes indicated on Drawings.
      - 1) Shop fabricate and weld or solder all corners.
  - 2. Pre-finished aluminum:
    - a. Thickness: Minimum 0.050 IN.
    - b. Texture: Smooth
    - c. Coated on exposed face with PVDF coating having a minimum 70 PCT resin content and a minimum 1.0 MIL dry film thickness.
      - 1) Meet requirements of AAMA 2605.
      - 2) Color: Match existing trim colors
- B. Overflow Scuppers:
  - 1. Roofing manufacturer's recommended through-wall scupper design.
    - a. Size and location(s) as shown on Drawings.
- C. Scupper:
  - 1. Roofing manufacturer's recommended through-wall scupper design.
    - a. Size and location(s) as shown on Drawings.
  - 2. Conductor head profile per SMACNA Figure 1-25F.
    - a. Provide overflow opening with drip edge on front face of conductor. Size as indicated on drawings
  - 3. outlet tube.
- D. Retainer Clips and Continuous Cleats:
  - 1. 0.050 IN stainless steel.
  - 2. Fabricated in longest practical lengths.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Provide items to be built into other construction to Contractor in time to allow their installation.

### 3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions, SMACNA, and as indicated on Drawings.
- B. Weld aluminum to achieve weathertight joints and required details.
  - 1. Do not weld slip joints.
  - 2. Touch-up damaged prefinished items.
- C. Set top edges of membrane flashing and sheet metal flashing into reglets wherever practicable.
  - 1. Surface applied terminations will be allowed only where specifically detailed or otherwise approved in writing by the Engineer.
  - 2. Provide counterflashing at all reglets.
  - 3. Seal reglets and counterflashings in accordance with Specification Section 07 92 00.

- D. Fasten materials at intervals recommended by SMACNA.
- E. Form flashings to provide spring action with exposed edges hemmed or folded to create tight junctures.
- F. Provide dissimilar metals and materials protection where dissimilar metals come in contact or where sheet metal contacts mortar, concrete masonry or concrete.
- G. Provide all miscellaneous sheet metal items not specifically covered elsewhere, as indicated or required to provide a weathertight installation.
  - 1. Provide all components necessary to create weather-tight junctures between roofing and sheet metal work.
- H. Installation of Scupper:
  - 1. Flash the opening in the parapet wall and install the Seal all joints to provide complete weathertight installation.
  - 2. Flash roofing material onto scupper per roofing manufacturer's recommendations.

**END OF SECTION**

## **SECTION 07 92 00 JOINT SEALANTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Exterior Joint Sealants, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Concrete Institute (ACI):
    - a. 302.1R, Guide for Concrete Floor and Slab Construction.
  - 2. ASTM International (ASTM):
    - a. C834, Standard Specification for Latex Sealants.
    - b. C920, Standard Specification for Elastomeric Joint Sealants.
    - c. C1521, Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
  - 3. NSF International (NSF):
    - a. 61, Drinking Water System Components -- Health Effects.
  - 4. Underwriters Laboratories, Inc. (UL).
- B. Qualifications: Sealant applicator shall have minimum five years experience using products specified on projects with similar scope.
- C. Mock-Ups:
  - 1. Before sealant work is started, a mock-up of each type of joint shall be sealed where directed by the Engineer.
    - a. The approved mock-ups shall show the workmanship, bond, and color of sealant materials as specified or selected for the work and shall be the minimum standard of quality on the entire project.
    - b. Each sample shall cure for a minimum of seven days at which time the sealant manufacturer's authorized factory representative shall perform adhesion tests on each sample joint.
      - 1) Perform adhesion tests per ASTM C1521.
- D. If mock-up is not acceptable or if adhesion test fails, provide additional mock-up and adhesion testing as required until acceptable to Engineer.
- E. Caulk and Caulking are synonymous with sealant work.
- F. Paving Joints include joints in floor slabs, sidewalks, steps, ramps and curbs.
- G. Seal joints which would otherwise permit penetration of moisture or air, unless sealant work is specifically required under other Section.
- H. Provide sealant at following locations:
  - 1. Flashing reglets and retainers.
  - 2. Exterior wall joints.
  - 3. Masonry control joints, and between masonry and other materials.
  - 4. Isolation joints.
  - 5. Joints between paving or sidewalks and building.
  - 6. Joints at penetrations of walls, floors and decks by piping and other services and equipment not requiring firestopping.
  - 7. Perimeters door and window frames, louvers, grilles, etc.



8. Joints between dissimilar materials, to provide visually acceptable closures.
9. Solidly bed thresholds at exterior doors.
10. Other joints where caulking, or sealant is indicated.

1)

### 1.3 DEFINITIONS

- A. Defect(ive): Failure of watertightness or airtightness.
- B. Finish sealant: Sealant material per this specification applied over face of compressible sealant or expanding foam sealant specified, to provide a finished, colored sealant joint.
- C. Installer or Applicator:
  1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  2. Installer and applicator are synonymous.
- D. "Seal," "sealing" and "sealant": Joint sealant work.

### 1.4 SUBMITTALS

- A. Shop Drawings:
  1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling and bond breaker.
  3. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
  4. Certification of applicator qualification.
- B. Test Results:
  1. Provide adhesion test results for each sealant sample including adhesion results compared to adhesion requirements.
  2. Manufacturer's authorized factory representative recommended remedial measures for all failing tests.
- C. Samples:
  1. Cured sample of each color for Engineer's color selection.
  2. Color chart not acceptable.
- D. Informational Submittals:
  1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in manufacturer's original unopened containers with labels intact: Labels shall indicate contents and expiration date on material.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  1. Compressible sealant:
    - a. Schul International Company, LLC.
    - b. Emseal by Sika.
    - c. Norton.

- d. Sandell Moisture Protection Systems.
- 2. Expanding foam sealant:
  - a. M-D Building Products, Inc.
  - b. DAP Products, Inc.
  - c. FAI International, Inc.
  - d. [Power Fasteners.]
- 3. Fire-resistant sealant:
  - a. See Specification Section 07 84 00.
- 4. Polyether sealants:
  - a. BASF Corporation.
  - b. Chem Link.
  - c. Tremco Commercial Sealants & Waterproofing.
- 5. Polysulfide rubber sealant:
  - a. Pecora Corporation.
  - b. BASF Corporation.
  - c. PolySpec by ITW Polymers Sealants.
- 6. Polyurea joint filler:
  - a. Dayton Superior Corporation.
  - b. Euclid Chemical Company.
  - c. L&M by LATICRETE International, Inc.
  - d. BASF Corporation.
- 7. Polyurethane sealants:
  - a. Pecora Corporation.
  - b. Sika.
  - c. BASF Corporation.
  - d. Tremco Commercial Sealants & Waterproofing.
- 8. Silicone sealants:
  - a. Chem Link.
  - b. GE Silicones.
  - c. Dow.
  - d. Tremco Commercial Sealants & Waterproofing.
- 9. Backer rod, compressible filler, primer, joint cleaners, bond breaker:
  - a. As recommended by sealant manufacturer.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

## 2.2 MATERIALS

- A. Sealants - General:
  - 1. Provide colors matching materials being sealed.
  - 2. Where compound is not exposed to view in finished work, provide manufacturer's color which has best performance.
  - 3. Nonsagging sealant for vertical and overhead horizontal joints.
  - 4. Sealants for horizontal joints: Self-leveling pedestrian/traffic grade.
  - 5. Joint cleaner, primer, bond breaker: As recommended by sealant manufacturer.
  - 6. Sealant backer rod and/or compressible filler:
    - a. Closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, nonabsorbent, non-bituminous material recommended by sealant manufacturer to:
      - 1) Control joint depth.
      - 2) Break bond of sealant at bottom of joint.
      - 3) Provide proper shape of sealant bead.
      - 4) Serve as expansion joint filler.
- B. Compressible Sealant:
  - 1. Foamed polyurethane strip saturated with polymerized polybutylene waterproofing coated on front face with nonreactive release agent that will act as bond breaker for applied sealant.
    - a. Schul "Sealtite B".

2. Fire rated where required.
  3. Adhesive: As recommended by sealant manufacturer.
- C. Expanding Foam Sealant:
1. One or two component fire rated moisture cured expanding urethane.
  2. Shall not contain formaldehyde.
  3. Density: Minimum 1.5 PCF.
  4. Closed cell content: Minimum 70 PCT.
  5. R-value: Minimum 5.0/IN.
  6. Flame spread: Less than 25.
  7. Smoke developed: Less than 25.
- D. Fire-Resistant Sealant: See Specification Section 07 84 00.
- E. Polyether Sealant:
1. Silyl-terminated polyether polymer.
  2. ASTM C920, Type S, Grade NS, Class 50, Use NT, M, A, and O.
    - a. BASF MasterSeal 150.
    - b. Chem Link DuraLink.
    - c. Tremco Dymonic FC.
- F. Polysulfide Rubber Sealant:
1. One or two component.
  2. Meet ASTM C920.
    - a. Pecora Synthacalk GC2+.
    - b. PolySpec THIOKOL 2235.
- G. Polyurea Joint Filler:
1. Two component, semi-rigid material for filling formed or saw-cut control joints in interior concrete slabs.
    - a. Dayton Superior Corporation "Joint Fill, Joint Seal, Joint Saver II" as required for condition and recommended by manufacturer.
    - b. Euclid Chemical Company "EUCO QWIK" joint.
    - c. L&M "Joint Tite 750".
    - d. BASF MasterSeal "CR100" control joint filler.
  2. Comply with ACI 302.1R performance recommendations regarding control and construction joints.
  3. Color: Gray.
- H. Polyurethane Sealant:
1. One or two components.
  2. Paintable.
  3. Meet ASTM C920 Type S or Type M, Grade NS or P, Class 25, Use NT, T, M, A and O.
    - a. Pecora Dynatrol-IXL, Dynatrol II, Urexpan NR-200, NR-201.
    - b. Sika Chemical Corporation Sikaflex-1a, Sikaflex-2C NS/SL.
    - c. BASF MasterSeal NP-1, NP-II, SL-1 SL-2.
    - d. Tremco Dymonic or Dymeric, Vulkem 116,227,45,245.
- I. Silicone Sealant:
1. One component.
  2. Meet ASTM C920, Type S, Grade NS, Class 25, Use NT, G, A, O.
    - a. Chem Link DuraSil.
    - b. GE Silpruf, Silglaze II.
    - c. GE Sanitary 1700 sealant for sealing around plumbing fixtures.
    - d. Dow 786 for sealing around plumbing fixtures.
    - e. Dow 7565, 790, 791, 795.
    - f. Tremco Spectrem 1, Spectrem 3, Tremsil 600.
  3. Mildew resistant for sealing around plumbing fixtures.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Before use of any sealant, investigate its compatibility with joint surfaces, fillers and other materials in joint system.
- B. Use only compatible materials.
- C. Where required by manufacturer, prime joint surfaces.
  - 1. Limit application to surfaces to receive sealant.
  - 2. Mask off adjacent surfaces.
- D. Provide joint depth for joints receiving polyurea joint filler in accordance with manufacturer's recommendations.

### **3.2 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions and UL requirements.
- B. Clean all joints.
- C. Make all joints water and airtight.
- D. At changes in direction of joints, joint intersections and where sealant joints interface with other construction, install continuous sealant as necessary to ensure a weather-tight seal.
- E. Make depth of sealing compounds, except expanding foam and polyurea sealant, not more than one-half width of joint, but in no case less than 1/4 IN nor more than 1/2 IN unless recommended otherwise by the manufacturer.
- F. Provide correctly sized backer rod, compressible filler or compressible sealant in all joints to depth recommended by manufacturer:
  - 1. Take care to not puncture backer rod and compressible filler.
  - 2. Provide joint backer rod as recommended by the manufacturer for polyurea joint filler.
- G. Apply bond breaker where required.
- H. Tool sealants using sufficient pressure to fill all voids.
- I. Upon completion, leave sealant with smooth, even, neat finish.
- J. Where piping, conduit, ductwork, etc., penetrate wall, seal each side of wall opening.
- K. Install compressible sealant to position at indicated depth.
  - 1. Size so that width of material is twice joint width.
  - 2. Take care to avoid contamination of sides of joint.
  - 3. Protect side walls of joint (to depth of finish sealant).
  - 4. Install with adhesive faces in contact with joint sides.
  - 5. Install finish sealant where indicated.
- L. Install expanding foam sealant to minimum 4 IN depth or thickness of wall being penetrated if less than 4 IN or as indicated on Drawings.
  - 1. Provide adequate fire rated backing material as required.
  - 2. Hold material back from exposed face of wall as necessary to allow for installation of backer rod and finish sealant.
    - a. Allow expanding foam sealant to completely cure prior to installing backer rod and finish sealant.
  - 3. Trim off excess material flush with surface of the wall if not providing finished sealant.

### **3.3 SEALANT WORK**

- A. General:
  - 1. Work includes but is not limited to: Sealing all joints which will permit penetration of dust, air, or moisture.

2. Refer to SCHEDULE for materials to be used.
- 3.
- B. Concrete joints:
  1. Flooring joints.
  2. Isolation joints.
  3. Joints between paving or sidewalks and building.
  4. Construction, control and expansion joints.
  5. Joints between precast roof units and between precast roof units and walls.
  6. Joints between precast wall panels.
- C. Masonry:
  1. Masonry control joints.
  2. Brick expansion joints.
  3. Cast stone coping and sill head joints.
  4. Glass masonry joints.
  5. Between masonry and other materials.
- D. Flashing, reglets and retainers.
- E. Openings:
  1. Perimeters of door and window frames, louvers, grilles, etc.
  2. Door thresholds shall be set in a full bed of sealant.
  3. Glass and glazing: See specification Section 08 81 00.
- F. Interior finishes:
  1. Perimeter and penetrations of sound insulated walls.
  2. Casework and millwork: See Specification Section 06 41 00.
  3. Expansion and control joints in tile work.
- G. Plumbing fixtures.
- H. Penetrations of walls, floors and decks.
- I. Other joints where sealant, expanding foam sealant or compressible sealant is indicated.

### 3.4 FIELD QUALITY CONTROL

- A. Adhesion Testing:
  1. Perform adhesion tests in accordance with ASTM C1521 per the following criteria:
    - a. Water bearing structures: One test per every 1000 LF of joint sealed.
    - b. Exterior precast concrete wall panels: One test per every 2000 LF of joint sealed.
    - c. Chemical containment areas: One test per every 1000 LF of joint sealed.
    - d. Building expansion joints: One test per every 500 LF of joint sealed.
    - e. All other type of joints except butt glazing joints: One test per every 3000 LF of joint sealed.
    - f. Manufacturer's authorized factory representative shall recommend, in writing, remedial measures for all failing tests.

### 3.5 SCHEDULE

- A. Furnish sealant as indicated for the following areas:
  1. Exterior areas:
    - a. Above grade: Polyether
    - b. Below grade: Polyurethane.
  2. Interior areas:
    - a. Noncorrosive areas:
      - 1) Wet exposure: Polyether
        - a) Toilet rooms, locker rooms, janitor closets or similar areas: Mildew resistant silicone.
      - 2) Dry exposure: Polyether unless noted otherwise.
        - a) Sound insulated construction: Acoustical sealant.

- b. Sealant exposed to or having the potential of being exposed to concentrated chlorine gas or chlorine liquid: Polysulfide.
  - c. Casework, countertops and solid surface materials: Silicone.
    - 1) Sinks, fixtures or other areas subject to potential splash, spillage or condensation: Mildew Resistant Silicone.
- 3. Immersion:
  - a. Prolonged contact with or immersion in:
    - 1) Potable water:
      - a) Polysulfide.
      - b) NSF 61 approved.
    - 2) Nonpotable water, wastewater or sewage: Polysulfide.
- 4. Compressible sealant: Where indicated.
- 5. Exterior wall penetrations: Expanding urethane foam, with finish sealant.
  - a. Finish sealant:
    - 1) Exterior side:
      - a) Above grade: Polyether.
      - b) Below grade: Polyurethane.
    - 2) Interior side:
      - a) Noncorrosive area:
        - (1) Wet exposure: Polyether Dry exposure: Polyether unless noted otherwise.
- 6. Interior concrete slab formed or saw-cut control joints: Polyurea joint filler.

### END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK.



**DIVISION    08**

**OPENINGS**



THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 08 11 13**  
**HOLLOW METAL (HM) DOORS AND FRAMES**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Hollow Metal Doors and Frames in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

**1.2 QUALITY ASSURANCE**

- A. ASTM International (ASTM):
  - 1. ASTM A568 Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled
- B. Hollow Door and Frame Standards:
  - 1. ANSI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors
  - 2. ANSI A250.8 / SDI 100 Recommended Specifications for Standard Steel Doors and Frames
  - 3. ANSI A250.11 Recommended Erection Instructions for Steel Frames
- C. Fire Rated Doors and Frames:
  - 1. Label and list for ratings indicated by ITS – Warnock Hersey, UL or other testing and inspection agency acceptable to authorities having jurisdiction.
  - 2. Affix physical label or approved marking to fire door or fire door frame at an authorized facility as evidence of compliance with procedures of labeling agency.
  - 3. Where pairs of doors require fire rating (90 minute maximum), doors shall have passed appropriate test without the use of astragals.
  - 4. Positive Pressure:
    - a. Comply with Positive Pressure Requirements UL 10C, Category A or NFPA 252.
- D. Hurricane Resistant Openings - Florida Building Code with Miami-Dade NOA as indicated on the drawings, or equal:
  - 1. Doors and Frame Assemblies located in the exterior walls of building project shall comply with Florida Building Code Approval System as locally amended.
  - 2. Door assemblies shall resist cyclic pressures, static pressures and missile impact loads as detailed in:
    - a. Florida Building Code – latest edition, Test Protocols for High-Velocity Hurricane Zones.
      - 1) TAS 201, TAS 202 and TAS 203.
  - 3. Door assemblies shall bear label indicating compliance with applicable labeling requirements of the Florida Building Code.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. Use same reference numbers for openings as those in Door and Frame Schedule in Drawings
  - 2. Indicate door elevations, gauges; frame configuration; anchor types and spacing; location of reinforcement and preparations for hardware, including items recessed within door edges; details of moldings, removable stops, glazing and louvers; details of conduit and preparations for power, signal, and control systems.
- B. Product Data:
  - 1. Include construction details, material descriptions, core descriptions, fire resistance rating and finishes.
  - 2. Shop primer.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
  - 1. Base:
    - a. Curries
  - 2. Optional:
    - a. Ceco Door Products
    - b. Philipp Manufacturing Company
    - c. Republic Doors and Frames
    - d. Steelcraft Manufacturing
  - 3. Other manufacturers desiring approval comply with Section 00 26 00.
- B. Hurricane Resistant Doors/Frame Assemblies:
  - 1. Base:
    - a. Steelcraft Manufacturing
  - 2. Optional:
    - a. Curries
    - b. Ceco Door Products
- C. Galvanizing Repair Coating:
  - 1. Base:
    - a. Tnemec
  - 2. Optional:
    - a. ZRC Worldwide
    - b. SherwinWilliams
- D. Other manufacturers desiring approval comply with Section 00 26 00.

### **2.2 MATERIALS**

- A. Steel Sheet and Strip:
  - 1. Comply with ASTM A568.
- B. Corrosion Resistant Coating:
  - 1. Hot dip galvanized: A60 per ASTM A653.
  - 2. Minimum zinc-iron alloy coating: 0.6 OZ/FT<sup>2</sup> 183 g/m<sup>2</sup>.
  - 3. Provide corrosion resistant coating at door and frame components where used at wet and humid locations as defined by the following:
    - a. Openings located in an exterior wall.
    - b. Interior openings:
      - 1) Rooms with showers, tubs or pools.
      - 2) Operating rooms, scrub areas, sub-sterile, trauma rooms, hydrotherapy rooms, and decontamination showers.
      - 3) Soiled utility and soiled holding rooms.
      - 4) Loading docks, trash collection and compacting areas.
      - 5) Ambulance and vehicular garages.
      - 6) Rooms with sterilizers, autoclaves, tunnel washer equipment and similar Central Sterile Reprocessing equipment.
- C. Primer:
  - 1. Shop prime.
  - 2. Clean and phosphatize doors and frames.
  - 3. One coat of baked-on rust inhibiting primer paint in accordance with ANSI A250.10.
  - 4. Suitable and compatible as base for specified finish paints.
- D. Galvanizing Repair Coating:
  - 1. Galvanized coating repair.
  - 2. VOC 250 g/L maximum.

## E. Hollow Metal Doors:

1. Comply with ANSI/SDI A250.8.
2. Determination of performance level for each door:
  - a. Use level of HM door indicated for its location, size and other listed criteria.

Schedule of HM Door Levels			
Location	Additional Criteria	HMMA Level	Miscellaneous
Exterior Doors <sup>1</sup> (flush)	Openings where each leaf is less than 47 IN	Level 3 (Extra Heavy duty)	Galvanized / galvanized, Thermally Insulated
	Openings where one or more of the leaves exceeds 47 IN	Level 4 (Maximum-duty)	
Exterior Doors <sup>1</sup> (stile and rail)	All	Level 3 (Extra Heavy duty)	Galvanized / galvanized, Thermally Insulated
	2		
Interior Doors	Non-fire rated	Level 3 (Extra Heavy duty)	--
	Fire rated	Level 3 (Extra Heavy duty)	Labeled as indicated (w/out astragal wherever possible)
	Wet / Humid Areas <sup>2</sup>	Level 3 (Extra Heavy duty)	Galvanized / galvanized; Moisture-resistant core - Fire resistant were required

**Notes**

Refer to Door Schedule for indication of the Door Type (I.e. Width, Fire Rating, Flush vs. Stile & Rail, etc.)

Refer to Plans for door location (Exterior vs. Interior).

Where Hurricane or Tornado resistant openings are specified: Refer to ADDITIONAL REQUIREMENTS for appropriate door/frame construction.

Not all items included in table may apply to subject project.

**Footnotes**

1. Refer to Part 2.2 MATERIALS for definition of Exterior locations.
2. Refer to Part 2.2 MATERIALS for definition of Wet/Humid locations.
3. Door Thickness: 1-3/4 IN 45 MM.
  - a. Door Thickness: 1-3/8 IN 35 MM.
4. ANSI A250.8 Level 4, Maximum duty, physical performance Level A.
  - a. Face Sheet Thickness: 0.067 IN (14 GA) 1.7 MM.
5. ANSI A250.8 Level 3, Extra Heavy duty, physical performance Level A.
  - a. Face Sheet Thickness: 0.053 IN (16 GA) 1.3 MM.
6. ANSI A250.8 Model 2, Seamless.
7. End closures at top and bottom of door:
  - a. Top: Flush closure top cap. Minimum Sheet thickness: 0.032 IN (20 GA) 0.8 MM.
  - b. Bottom: Flush closure. Minimum Sheet thickness: 0.032 IN (20 GA) 0.8 MM.
  - c. Bottom: Inverted channel. Minimum Sheet thickness: 0.053 IN (16 GA) 1.3 MM.
8. Vertical door edges:
  - a. Lock Stile Edges: Beveled 1/8 IN 3 MM per 2 IN 50 MM.
    - 1) Exception for inactive leaves: Fabricate inactive leaves with a square edge at the lock stile edge. Active leaves to be beveled per above.
    - 2) Hinge Stiles Edge: Beveled 1/8 IN 3 MM per 2 IN 50 MM.
    - 3) Exceptions for Double Acting Doors: Provide convex, radiused edges at lock stiles and hinge stiles.
9. Hardware Reinforcement (doors):
  - a. Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as door face sheets.
  - b. Minimum thickness: As prescribed in ANSI/SDI A250.6; Upgrade as necessary for conditions such as door weight, size, frequency, etc. and as follows:
  - c. Butt Hinges: 0.167 IN (7 GA) 4 MM.
  - d. Continuous hinges: Reinforce with 0.067 IN (14 GA) 4 MM thick x 1-1/4 IN 32 MM wide strapping extending full height and welded to hinge edge of door.

- e. Closers and Overhead Stops: 0.067 IN (14 GA) 4 MM.
- 10. Cores:
  - a. Steel stiffeners where structurally required.
  - b. Exterior Doors:
    - 1) Thermally insulated core.
      - a) 1.0 LBS/CF 16 kg/m<sup>3</sup> Polystyrene.
      - b) Minimum R-value: 2.0 when tested according to ASTM C1363.
  - c. Interior doors:
    - 1) Non-rated doors: Kraft honeycomb laminated to face sheets.
    - 2) Rated doors: Fire resistant core as required by label.
    - 3) Wet/humid Areas: Moisture resistant materials, fire resistant where applicable.
  - d. Specific materials used for above listed core types: Manufacturer's option.
  - e. Reinforce for Hardware.
- F. Hollow Metal (HM) Frames:
  - 1. Comply with ANSI/SDI A250.8 and with details indicated for type and profile in accordance with SDI 111.
  - 2. Fabricate frames with mitered or coped corners and 1/2 IN 13 MM nominal backbend.
    - a. Provide extended backbend at wall tile applications as detailed in drawings.
    - b. Touch-up galvanized/galvannealed frames with zinc-rich primer.
  - 3. Fabricate frames as Face Welded (modified ANSI definition):
    - a. Face Joints: Continuously back weld face joints (weld on concealed side).
      - 1) Fill and finish exposed sides to be free of visible seams.
    - b. Intersections of Rabbets, Stops and Soffit Joints: Fabricate to hairline joints. Stitch weld on concealed side.
    - c. Split type frames and knock down type frames are not acceptable.
    - d. Fasteners which are exposed to view are not acceptable.

Schedule of HM Frames			
Location	Criteria	Minimum Thickness	Miscellaneous
Exterior Frames <sup>1</sup>	Standard and Thermally Enhanced	0.067 IN (14 GA)	Galvanized / galvannealed
Interior Frames <sup>1</sup>	Non-fire rated	0.053 IN (16 GA)	--
	Fire rated	0.053 IN (16 GA)	--
	Frames for doors with automatic openers	0.067 IN (14 GA)	--
	Wet / Humid Areas <sup>2</sup>	0.053 IN (16 GA)	Galvanized / galvannealed

**Notes**

Gauge of frame listed is the minimum. Use heavier gauge as required due to size, physical configuration or if required to meet fire label requirements.

Refer to Door Schedule for indication of the Frame Type (I.e. Width, Single vs. Pair; Fire Rating, etc)

Refer to Plans for door location (Exterior vs. Interior).

Where Hurricane or Tornado resistant openings are specified: Refer to ADDITIONAL REQUIREMENTS for appropriate door/frame construction.

Some items listed may not apply to subject project.

**Footnotes**

1. Refer to Part 2.2 for definition of Exterior locations.

2. Refer to Part 2.2 for definition of Wet/Humid locations.

- G. Light Kits:
  - 1. Label for intended opening.
  - 2. Fixed Stop:
    - a. Locate at exterior face.
    - b. Integral to door/frame.
  - 3. Removable Stop:

- a. Locate on interior face.
  - b. Snap-in stops or stops secured with countersunk Phillips head machine screws.
- H. Silencers:
  - 1. ANSI/BHMA 156.16
    - a. Diameter: 1/2 IN.
    - b. Projection: 1/8 IN.
    - c. Tamper-proof.
    - d. Base Product – Steel Frames: SR64 by Ives.
    - e. Base Product – Wood Frames: SR65 by Ives.
  - 2. Quantity:
    - a. Three on strike jamb of single frames.
    - b. Two per door for pair doors. Locate at head.
  - 3. Space per manufacturer's recommendations.
- I. Hardware Reinforcement:
  - 1. Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
  - 2. Minimum thickness: As prescribed in ANSI/SDI A250.6; upgrade as necessary for conditions such as door weight, size, frequency, etc. and as follows:
    - a. Butt Hinges: 7 GA.
    - b. Continuous hinges: Reinforce with 0.067 IN (14 GA) 1.7 MM thick x 1-1/4 IN 32 MM wide strapping extending full height and welded to hinge jamb door rabbet of frame.
    - c. Closers and Overhead Stops: 0.093 IN (12 GA) 2.4 MM thick x 12 IN 305 MM long strapping welded to vertical flange of frame.
- J. Head Stiffeners:
  - 1. Provide at double egress frames:
  - 2. Position stiffeners at mid span of frame opening.
- K. Junction Boxes:
  - 1. Sheet metal enclosure:
    - a. Provide to facilitate pulling of wires and making electrical connections.
    - b. Weld to back side of frames.
  - 2. Material: 0.032 IN (20 GA) 0.80 MM sheet steel.
  - 3. Size and shape: As required by hardware device.
  - 4. Include knockout to receive 1/2 IN 13 MM conduit.
  - 5. Locate Junction Boxes in frames scheduled to receive electrified security, door hardware devices, or both.
- L. Jamb Anchors:
  - 1. ASTM A879 Commercial Steel, 4 OZ/SF coating; mill phosphatized.
    - a. Frames in exterior walls:
      - 1) Steel sheet complying with ASTM A1008 or ASTM A1011, hot-dip galvanized according to ASTM A153, Class B.
  - 2. Provide anchors in accordance with manufacturer's recommendations on fire rated doors.
  - 3. Provide minimum number as indicated in following table:

Minimum Quantity of Jamb Anchors	
Nominal Frame Height	Minimum Quantity per Jamb
Less than 60 IN 1.5 m	2
60 IN to 90 IN 1.5 M to 2.3 m	3
90 IN to 120 IN 2.3 M to 3 m	4
120 IN to 150 IN 3 M to 3.8 m	5
Greater than 150 IN 3.8 m	Add 1 additional for each 30 IN 760 MM increase in height thereafter

- a. Jamb anchors for stud framed walls:
  - 1) Z-shaped clips, welded to inside of frames; not less than 0.042 IN (18 GA) 1 MMthick, or compression anchors to suit frame size.
  - 2) Attach anchors to studs with screws.
- b. Jamb anchors for masonry walls:
  - 1) Adjustable strap-and-stirrup or T-shaped anchors to suit frame size.
  - 2) Minimum 0.042 IN (18 GA) 1 MM.
  - 3) Corrugated or perforated straps:
    - a) Minimum 2 IN 50 MMwide by 10 IN 254 MM long.
  - 4) Wire anchors:
    - a) Minimum 0.184 IN (6 GA) 5 MMthick.
  - 5) Embed long leg into masonry wall as units are placed.
  - 6) Post installed expansion type for in place concrete or masonry:
    - a) Minimum 3/8 IN 10 MMcountersunk, flat head expansion bolts with expansion shields or inserts.
    - b) Include pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
    - c) Minimum embedment length: 1-3/4 IN 45 MM.
- c. Floor Anchors:
  - 1) Same for Jamb Anchors but not less than 0.053 IN (12 GA) 2.4 MM thick.
    - a) Anchors built into exterior walls:
      - (1) Steel sheet complying with ASTM A1008 or ASTM A1011, hot-dip galvanized according to ASTM A153, Class B.
    - b) Monolithic concrete slabs:
      - (1) Clip type anchors, with two holes to receive fasteners.
    - c) Topped slabs:
      - (1) Adjustable anchors with extension clips allowing not less than 2 IN 50 MM height adjustment. Terminate bottom of frames at finish floor surface.
  - 2) Include concealed fasteners.
  - 3) Provide anchors in accordance with manufacturer's recommendations at fire rated openings.
- d. Head Anchors for Double Egress Frames:
  - 1) Provide two head frame anchors for Double Egress frames.
  - 2) Locate at third points of span.
- 4. Spreaders:
  - a. Provide removable spreaders at bottom of door frames.
- 5. Inserts, bolts and fasteners:
  - a. Manufacturer's standard units
  - b. Galvanize items built into exterior walls ASTM A153, Class C or D as applicable.
- M. Hurricane Resistant Assemblies:
  - 1. General:
    - a. The additional requirements of this article pertain to hollow metal door and frame assemblies located in or on the exterior wall.
    - b. The requirements of this article supersede lesser requirements listed elsewhere in this section.
    - c. The following are minimum requirements; Increase where required to comply with test protocol indicated in QUALITY ASSURANCE article.
    - d. Base Product: Series-H by Steelcraft.
  - 2. Hurricane Resistant Doors:
    - a. Face sheets: Minimum 0.053 IN (16 GA) 1.3 MM hot-dipped galvanized steel.
    - b. Continuous vertical mechanical interlocking joints at lock and hinge edges with edge seams welded filled and ground smooth.
    - c. Top and bottom steel reinforcement channels: Galvanized 0.067 IN (14 GA) 1.7 MM, projection welded to both face sheets on 4 IN 100 MM centers.

- d. Hinge reinforcements: 0.167 IN (7 GA) 4 MM galvanized steel, projection welded to edge of door.
- e. Door faces: Reinforced as required by test protocol indicated.
- f. Thermally insulate and sound deaden.
- 3. Hurricane Resistant Frames:
  - a. Fabricated from Minimum 0.053 IN (16 GA) 1.3 MM, hot-dipped galvanized steel.
  - b. Frame Profiles: As indicated.
  - c. Corner connections: Set-up and arc welded, ground, dressed smooth and painted.
  - d. Hinge reinforcements: 0.167 IN (7 GA) 4 MM galvanized steel, for hinges scheduled.
  - e. Anchors:
    - 1) Type as required for wall types indicated.
    - 2) Quantity as required for system performance.
  - f. Provide steel plaster guards for mortised cutouts.

N. Accessories:

### 2.3 FABRICATION

- A. Factory fit doors to frame openings with uniform clearances in accordance with:
  - 1. NFPA 80 for fire rated doors.
  - 2. NFPA 105 for smoke control doors.
  - 3. ANSI A250.8.
  - 4. Locally adopted Building Code.
  - 5. SDI 117.

Door To Frame Clearances Table		
Location		Clearance
Door to Frame at top and sides		1/8 IN 3 MM
Meeting Stiles at Pair Doors		1/8 IN 3 MM
Face of door to face of Stop		3/32 IN 2.4 MM
Door Bottom to Floor / Flooring	Top of floor covering	Less than 1/2 IN 13 MM
	Non-combustible sills	3/8 IN 10 MM
	Bare floors; No flooring or sills	Greater than 3/4 IN 19 MM

- B. Hardware Preparation:
  - 1. Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to Door Hardware Schedule and templates furnished as specified in Section 08 71 00.
  - 2. Locate hardware indicated, or if not indicated, according to ANSI/SDI A250.8.
  - 3. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  - 4. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  - 5. Coordinate locations of conduit and wiring boxes for electrical connections.
  - 6. Remove mill scale and foreign materials, touch up damaged galvanized or galvanized surfaces.
- C. Hollow Metal Doors:
  - 1. Exterior:
    - 2. Provide weep openings in bottom of exterior doors.
    - 3. Seal joints in top edges of doors against water penetration.
  - 4. Glazed lites:
    - a. Factory cut openings in doors.
    - b. Locate bottom of glazed panel 43 IN maximum above finish floor.
  - 5. Astragals:



- a. Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire performance rating or where indicated.
- D. Fire Labels:
  1. Affix permanent labels to fire rated units in accordance with testing agency requirements.
  2. Where labels are stamped or embossed directly into frame, ensure label will remain legible upon application of finishes.
  3. At openings where continuous hinges or other items conceal fire label, locate labels on alternative locations as allowed by listing agency and local authorities.
- E. Door Position Switches (DPS):
  1. Coordinate locations with Security System provider.
  2. Locate DPS frame head approximately 4 IN 100 MM from latching door edge.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Examine structure, substrates, and conditions under which work is to be installed for conditions detrimental to correct and timely completion.
- B. Installation constitutes acceptance of responsibility for performance.

### **3.2 INSTALLATION**

- A. Frames:
  1. Place frames before construction of adjacent walls.
    - a. Where adjacent walls are cast in place concrete, set frames after wall is constructed.
  2. Adjust hollow metal door frames for square, alignment, twist, and plumb to following tolerances:
    - a. Plumb: Plus or minus 1/16 IN 1.5 MM, measured at jambs at floor.
    - b. Level: Plus or minus 1/16 IN 1.5 MM per leaf, measured across width of header.
    - c. Square: Plus or minus 1/16 IN 1.5 MM, measured at door rabbet on a line 90 DEG from jamb perpendicular to frame head.
    - d. Alignment: Plus or minus 1/16 IN 1.5 MM, measured at jambs on horizontal line parallel to plane of wall.
    - e. Twist: Plus or minus 1/16 IN 1.5 MM, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  3. Do not remove spreaders until surrounding wall construction is complete.
  4. After surrounding walls have been constructed, verify frames remain in alignment.
    - a. Re-check for level, plumb, square, twist and issues that will prevent proper fitting of doors.
    - b. Correct deficiencies before allowing surrounding construction to proceed.
    - c. Coordinate with other trades to correct alignment problems.
  5. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
  6. Verify frame alignment, and correct deficiencies prior to hanging doors.
  7. Install frames with removable glazing stops located on secure side of opening.
  8. Provide anchor type specified for wall condition.
  9. Align anchors at hinge centers on hinge jamb and at corresponding heights on strike jamb.
  10. Secure frame to wall per manufacturer's instructions.
- B. Prime Coat Touchup:
  1. Immediately after erection, sand smooth rusted or damaged areas of primer coat.
  2. Touch up primer coat with compatible air drying primer.
  3. Leave surfaces smooth for finish painting.
- C. Field Painting of HM Frames and Doors:
  1. Painting of Exterior openings: Specified in Section 09 91 13.

2. Painting of Interior openings: Specified in Section 09 91 23.
- D. Install Sealants:
  1. Seal frames to walls.
  2. Seal frames to floor slabs and hard floor finishes.
  3. Hairline gap at intersections of head and jamb frames intersections of rabbets and stops:
    - a. Fill exposed seam with painter's caulk.
  4. Sealants:
    - a. Exterior: See Section 07 92 13.
    - b. Interior: See Section 07 92 16.
- E. Install silencers.

### **3.3 ADJUSTING AND CLEANING**

- A. Verify frames remain in proper alignment.
- B. Correct deficiencies before proceeding with surrounding construction.
- C. Remove protective wrappings from doors and frames.
- D. Verify fire labels are intact, and readily visible.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

Revised for Project: MM/DD/YYYY

## SECTION 08 33 23 OVERHEAD COILING DOORS (CD)

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Furnish labor, materials, tools, equipment, and services for Overhead Coiling Doors, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.
- C. Coiling Door (CD) types. Refer to Overhead Door Schedule for indication of each type to be used.
  - 1. CD-IS: Coiling Door - Insulating Slat.
  - 2. CD-FR: Coiling Door - Fire Rated.
  - 3. CD-NR: Coiling Door - Non-Rated.
- D. Coordinate electrical hookups with Electrical Specification Divisions.

#### 1.2 DESIGN CRITERIA

Design Windspeed to Pressure at 33 FT or less above Grade	
Design Windspeed MPH kph	Pressure PSF Pa
87 140	20 960
91 146	21.5 1030
110 177	30 1440
117 188	35 1680
120 193	36 1725
155 249	60 2880

\* Shaded areas: Verify with MFR that overhead door type is available at these higher wind pressures.

- A. Design Exterior Doors to meet Design Wind Load.
  - 1. Design wind load pressure: 36 PSF 1725 Pa minimum.
- B. Weather Seals:
  - 1. Bottom Bar Seal:
    - a. Motorized doors with safety edge: Combination electric safety edge device and weather seal.
    - b. Non-motorized doors: Manufacturer's standard neoprene astragal seal at bottom bar.
  - 2. Guide weatherstripping which seals against the exterior face of slats.
- C. Windlocks:
  - 1. Provide windlocks on doors used in an Exterior wall, regardless of width.
  - 2. Provide roller windlocks and roller endlocks where door width exceeds 12 FT- 4 IN 3.75 m.

#### 1.3 SUBMITTALS

- A. Shop Drawings:
  - 1. Indicate location and size of each door; elevation of each kind of door and other pertinent data.
- B. Project Information:
  - 1. Certificate of UL construction.

- C. Contract Closeout Information:
  - 1. Operation and Maintenance Data.
  - 2. Owner instruction report.
  - 3. Warranty.

#### 1.4 WARRANTY

- A. Manufacturer's standard two (2) year warranty covering repair or replacement resulting from defects in material or workmanship.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Overhead doors:
  - 1. Base:
    - a. CornellCookson
  - 2. Optional:
    - a. McKeon.
    - b. North American Rolling Door, Wayne Dalton.
    - c. Overhead Door.
    - d. Raynor.
- B. Other manufacturers desiring approval comply with Section 00 26 00.

#### 2.2 MATERIALS

- A. Curtain:
  - 1. 2 – 3 IN 75 MM tall slats, interlocked to form an upward coiling curtain.
  - 2. Nominal Thickness: 3/4 IN 19 MM.
  - 3. Gauge as determined by application, wind load, door width, and materials.
  - 4. Type of material and finish as indicated for each door.
  - 5. Typical Slat Style:
    - a. Non-insulated doors (CD-NR & CD-FR types):
      - 1) Flat face, CornellCookson type 5F, unless otherwise indicated.
  - 6. Fenestrated Slats:
    - a. Provide on doors where indicated.
  - 7. Endlocks:
    - a. Minimum requirement: Provide malleable iron endlocks at each end of alternating slats to act as a wearing surface and to maintain slat alignment.
    - b. Endlocks at Motorized Doors: Continuous endlocks, (every slat).
    - c. Endlocks at Exterior Doors where door width exceeds 12 FT- 4 IN 3.75 m: Provide roller endlocks where roller windlocks are required.
- B. Bottom Bar:
  - 1. Curtain to be reinforced with bottom bar consisting of 2 back-to-back angles.
  - 2. Material and Finishes: As indicated for each door type, generally matching the curtain material and finish.
  - 3. Neoprene bottom seal to protect floor surface at sill.
    - a. Except where Safety Edge is indicated.
- C. Bracket plates:
  - 1. Minimum thickness: 1/4 IN 6 MM.
  - 2. Fitted with sealed ball bearing on drive end.
  - 3. Material and Finishes as indicated for each door type.
- D. Spring counterbalance:
  - 1. Housed in a steel pipe of diameter and wall thickness to limit deflection to 0.03 IN/FT 2.5 MM/m.

2. Springs: Helical torsion type designed to include an overload factor of 25 PCT and for ease of operation.
- E. Mounting:
  1. Typical configuration:
    - a. Face of wall (inside).
- F. Guide angles and wall angle assemblies:
  1. Minimum thickness: 3/16 IN 4.75 MM.
  2. Provide adequate overlap of guide flanges over curtain to satisfy design windload.
  3. Material and Finishes: As indicated for each door type.
  4. Include removable section on coil side for installation and service.
    - a. Exception: Omit requirement where Stainless Steel or Aluminum guides are specified.
- G. Hood:
  1. Typical profile:
    - a. Round.
- H. Component Materials and Finishes:

Materials and Finishes for Galv/Steel (G/S) Coiling Units			
Component Item	Material <sup>2</sup>	Primer <sup>2</sup>	Finish
Curtain Slats	Galv Steel	Baked-on Primer	Powder Coat
Bottom Bar	Galv Steel	Baked-on Primer	Powder Coat
Wall/Guide Angles	Ferrous Steel	Shop Coat Primer	Paint in Field
Hood	Ferrous Steel	Shop Coat Primer	Paint in Field
End Bracket Plates	Ferrous Steel	Shop Coat Primer	Paint in Field
Fascia <sup>1</sup>	Ferrous Steel	Shop Coat Primer	Paint in Field

**Footnotes**

1. Where Fascia is required.
2. Upgrade components which are exposed to weather to Galvanized Steel and Baked-on Primer.

1. Definition of items indicated in above Table:
  - a. Galvanized Steel, ASTM A653 G90 Z275.
  - b. Baked-on Primer: Epoxy modified polyester, applied at factory.
    - 1) Use on galvanized components.
  - c. Shop coat primer: Rust inhibiting primer, applied at factory.
    - 1) Use on non-galvanized components.
  - d. Powder Coat: Factory applied Powder Coat.
    - 1) Color to be selected by Architect.
2. Field painted items:
  - a. Specified in Section 09 91 13 (for exterior doors)
  - b. Specified in Section 09 91 23 (for interior doors).

**2.3 OPERATION – MOTORIZED UNITS**

- A. Refer to Overhead Door Schedule for appropriate operation type for each opening
- B. Base Product: M100 FireGard Closing Systems by CornellCookson.
- C. Motorized doors:
  1. Manufacturer's heavy duty, high starting torque motor rated for continuous duty. Sized to meet requirements.
  2. Comply with UL 325.
  3. Opening rate: Between 8 and 9 IN/SEC 0.2 and 0.23m/s.
  4. Gear reduction.

5. Solenoid braking.
  6. Limit switches for upper and lower limits of door travel.
  7. Magnetic relay contactor.
  8. Overload protection.
  9. Safety System:
    - a. Wireless Electric Safety Edge:
    - b. Electric Safety Edge (hardwired):
  10. Back-up operation:
    - a. Hand Chain (HC) with electrical interlock to break motor circuit when hand chain is engaged.
  11. Controls:
    - a. Control devices:
  12. Locking at motorized units:
- D. Normal Operation: As indicated for motorized doors.
1. Emergency Operation: Doors shall not require a releasing device when activated by an alarm signal. Doors shall maintain an average closing speed of not more than 9 IN per second 0.23 m/s during automatic closing. Upon activation, electric sensing edge and push button are inoperable. Upon clearing of the alarm signal, doors shall immediately reset by opening with the push button.
- E. Power Failure Operation:
1. Connect Doors to emergency power circuit.
  2. Upon power failure, support door in open position with battery backup until Emergency Power is activated. Upon restoration of power, doors shall return to Normal Operation without need for resetting or adjusting.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Verify that dimensions are correct.
  1. Resolve any discrepancies between "design" dimensions and "actual" dimensions.
- B. Verify suitability of substrate and opening to accept installation.
- C. Installation constitutes acceptance of substrate and responsibility for performance.

### **3.2 INSTALLATION**

- A. By manufacturer or authorized representative.
- B. Prior to occupancy, adjust door for smooth operation.

**END OF SECTION**

**SECTION 08 41 13**  
**LOW-RISE ALUMINUM STOREFRONT**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Aluminum Storefront, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

**1.2 QUALITY ASSURANCE**

- A. Provide aluminum storefront engineered by specialty structural engineer to support superimposed loads indicated.
  - 1. Comply with Section 01 71 21, Specialty Engineering Requirements.
  - 2. Include headers and reinforcing members around openings.
  - 3. Required details defining method of fastening throughout system and attachments to supporting primary structure included in engineering requirement.
- B. Installer Qualifications:
  - 1. Firm with not less than ten (10) years successful experience in erection and installation of curtain wall systems similar in design and scale of systems proposed for this project.
  - 2. Certified by curtain wall manufacturer in erection and installation of manufacturer's products.
  - 3. Submit a minimum of five (5) references of projects similar in size and scope.
  - 4. Submit results of monthly onsite inspections conducted by manufacturer's field service representative, to assure proper installation, to Architect.
  - 5. Upon completion of project, submit report from manufacturer's field service representative.
    - a. See Submittals, Contract Closeout Information, below.
- C. Welding and Welders:
  - 1. Utilize skilled and qualified welders, licensed where required in accordance with local building regulations.
  - 2. Perform welding in conformance with AWS structural welding code.
- D. ASTM International (ASTM):
  - 1. ASTM E1332 Standard Classification for Rating Outdoor-Indoor Sound Attenuation
- E. Preinstallation Conference:
  - 1. See Section 01 31 19.
- F. Mockup:
  - 1. Erect mockup wall 2 bays wide.
  - 2. Install complete with glass, glazing, insulation, spandrels, anchors and other components required to create entire assembly.
  - 3. Mockup wall may be retained in place as a permanent part of building.
  - 4. If constructed separate from building, mockup wall shall remain intact during balance of curtain wall installation and used for comparative purposes.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. Elevations, sections and details for review of design intent and anchorage to building frame.
  - 2. Indicate member type, location, spacing, size of members and method of attachment to support structure.
  - 3. Indicate supplemental bracing, strapping, splices, bridging, accessories, and details.
- B. Product Data:



1. Manufacturer product literature.
  2. Miami-Dade NOA
- C. Samples:
1. Range samples of aluminum finishes.
- D. Project Information:
1. Engineering calculations indicating design moments, shears, and other forces sealed by Specialty Structural Engineer.
    - a. Submit concurrent with Shop Drawings.
  2. Communicate special requirements, changes, or modifications to curtain wall and interface between curtain wall support system and building structural frame.
  3. Sample of Special Warranty demonstrating compliance with specified requirements.
  4. Meeting minutes from Preinstallation Conference.
  5. Installer Qualifications per Quality Control, above.
  6. Certified independent laboratory test reports verifying compliance with performance characteristics.
- E. Contract Closeout Information:
1. Special Warranty.
    - a. See Section 01 78 36.
  2. Maintenance data.
    - a. See Section 01 78 43.
  3. Warrantable report by manufacturer's field service representative stating curtain wall systems have been installed in accordance with manufacturer's published specifications, drawings, details and project design requirements.

#### 1.4 SPECIAL WARRANTY

- A. Written ten (10) year warranty signed jointly by manufacturer and installer, agreeing to repair or replace defective materials or workmanship, including noncompliance with specification requirements and industry standards, which result in failure of the curtain wall system, finish, glass or parts.
1. Failure includes but not limited to:
    - a. Defects in materials, workmanship, water infiltration of assembly, air infiltration of assembly, glazing, sealant or defects which influence system capacity to perform as a weather tight envelope.
  2. Glass:
    - a. Free from obstruction of vision as a result of dust or film formation on internal glass surfaces caused by failure of hermetic seal.
    - b. Warranty period: Ten (10) years.
  3. Finish:
    - a. Cracking, crazing, flaking, blistering, or combination of Anodized finishes:
      - 1) Warranty period: Ten (10) years.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Aluminum Storefront:
1. Base:
    - a. Wausau Window and Wall Systems
  2. Optional:
    - a. EFCO Corporation
    - b. Oldcastle Building Envelope
    - c. Schuco USA LLLP
- B. Other manufacturers desiring approval comply with Section 00 26 00.

## 2.2 DESIGN CRITERIA

- A. Design and fabricate curtain wall systems under responsibility of one manufacturer.
- B. Movements of Building Structure:
  - 1. Inter-story drift caused by wind or earthquake forces.
    - a.  $h/100$  maximum.
  - 2. Live load deflection of the supporting members.
    - a.  $L/360$  maximum.
- C. Design Wind Loads - Allowable Stress Design (ASD):
  - 1. Use most restrictive of following:
    - a. Wind pressures as required per local building code based on wind speed, exposure factor and importance factor noted in the Structural Drawings.
    - b. Wind Pressures defined by Building Code as locally adopted and amended.
    - c. Deflection values: Use the most restrictive of the following:
      - 1) Limit deflection to values specified for Uniform Design Load Test.
      - 2) Limit deflection to comply with Building Code as locally adopted and amended.
      - 3) Limit deflection to  $L/175$  or  $3/4$  IN 19 MM maximum.
  - 2. Design structural components, including transoms, mullions and anchors, complying with deflection and stress requirements.
- D. Thermal Expansion and Structural Movement:
  - 1. Expansion and contraction, caused by changes in surface temperature equal to  $\Delta T$ .
    - a.  $\Delta T$  for this project: 200 DEGF.
    - b. Thermal contraction/expansion in this range shall not cause buckling, stresses on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects over this temperature range.
    - c. Operating windows and doors shall function normally over this temperature range.

## 2.3 MATERIALS

- A. Extruded Aluminum:
  - 1. ASTM B221, alloy 6063-T6 for extrusions ASTM B209, alloy 5005-H16 for sheets.
  - 2. Member wall thickness: Each framing member shall provide structural strength to meet specified performance requirements.
  - 3. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.
- B. Framing System:
  - 1. T14000 Series Flush Glaze by Wausau Window and Wall Systems
  - 2. Position of glass in frame:
    - a. Front Plane.
  - 3. Size of framing members: 2 IN x 4-1/2 IN 51 MM x 114 MM.
  - 4. Provide system to receive 1 IN 25 MM insulating glass.
  - 5. Provide strike boxes at openings in framing system.
  - 6. Provide adaptors, sill flashing and thermal pocket fillers as required for installation.
- C. Internal Reinforcing:
  - 1. ASTM A36 for carbon steel.
  - 2. Shapes and sizes to suit installation.
  - 3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.
- D. Anchorage Devices:
  - 1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars and tubes.
  - 2. Hot-dip galvanize steel assemblies per ASTM A123: 2.0 ounce minimum coating.
- E. Fasteners:

1. Anodized aluminum or non-magnetic 300 series stainless steel which will not cause electrolytic action or corrosion.
  2. Provide Phillips flat head screws where exposed.
  3. Finish exposed aluminum fasteners to match aluminum finish.
- F. Sealants:
1. See Section 07 92 13.
  2. Use exposed sealants of color to match aluminum finish.
  3. Include sealants and caulking required within and around storefront.
- G. Glass:
1. See Section 08 81 23 for glass to be installed under this section.
- H. Brackets, anchors and reinforcements:
1. Aluminum wherever possible.
  2. Where steel is used: Include dissimilar metals protection to prevent galvanic action.
- I. Sill Receiver:
1. Continuous, extruded aluminum finished to match frames.
  2. Thermal break for improved performance.
  3. Seal seams and dam ends per manufacturer's instructions.
- J. Flashings:
1. Manufacturer standard at sill or as indicated.
  2. Minimum 0.040 IN aluminum.
  3. Finish to match storefront if exposed.
  4. Mill finish if concealed.
- K. Anodic Finish:
1. Architectural Class I per AAMA 611.
    - a. 2-step electrolytic.
  2. Minimum Coating Thickness: 0.7 mils.
  3. Color:
    - a. No. 14, Clear, AAM10C21A41.
- L. PVDF Finish Coating:

## 2.4 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly.
- B. Accommodate expansion and structural movement of adjacent materials.
- C. Fit and assemble work at shop to maximum extent possible.
1. Accurately fit and secure joints and corners.
  2. Make joints flush, hairline and weatherproof.
  3. Weld by methods recommended by manufacturer and AWS to avoid discoloration.
  4. Grind exposed welds smooth and restore finish.
  5. Ease corners of cut edges to radius of 1/64 IN.
  6. Reinforce work as necessary to withstand wind loadings and to support system.
  7. Separate dissimilar metals with bituminous paint or separators to prevent corrosion.
  8. Separate metal surfaces at moving joints with plastic inserts or other non abrasive concealed inserts to prevent joint freeze-up.
- D. Arrange fasteners and attachments to conceal from view.
- E. Fully degrease and clean members prior to assembly or application of sealing compound or protective coatings.
- F. Reinforce frames and doors for hardware.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Verify building substrates permit installation of Mid-rise Aluminum Storefront according to manufacturer's instructions, approved shop drawings, calculations and contract documents.
- B. Do not install curtain wall until unsatisfactory conditions are corrected.

### **3.2 INSTALLATION**

- A. Set units plumb, level and true to line, without warp or rack of frame.
  - 1. Erection tolerances:
    - a. 1/8 IN in 10 FT 3 MM in 3 M vertically.
    - b. 1/8 IN in 20 FT 3 MM in 6 M horizontally.
  - 2. Limit variations from theoretical locations: 1/4 IN 6 MM for any member at any location.
  - 3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 IN 1.5 MM from flush surfaces not more than 2 IN 50 MM apart or out-of-flush by more than 1/4 IN 6 MM.
- B. Separate dissimilar materials at contact points, including metal in contact with masonry, concrete, bituminous paint or pre-formed separators.
- C. Allow for required movement, including expansion and contraction.
- D. Anchor interior side of frame to insulated construction.
- E. Install doors and hardware in accordance with manufacturer's instructions.
- F. Sealant:
  - 1. Set sill members in full bed of sealant.
  - 2. Place members with internal sealants and baffles in accordance with manufacturer's instructions.
  - 3. Install perimeter sealant and backing materials between assemblies and adjacent construction.
  - 4. See Section 07 92 13.
- G. Water Drainage:
  - 1. Compartmentalize each light of glass using joint plugs and silicone sealant to divert water to horizontal weep locations.
  - 2. Provide weep holes or drainage slots within glazing pockets to drain any condensation or accumulating water within system to exterior.
- H. Glazing:
  - 1. See 08 81 23.

### **3.3 FIELD QUALITY CONTROL**

- A. Field Tests:
  - 1. Architect shall select Mid-rise Aluminum Storefront to be tested when representative portion of work has been installed, glazed, perimeter caulked and cured.
  - 2. Test for water penetration in accordance with AAMA 501.2-03, Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
  - 3. Where test results do not meet requirements: Correct deficiencies, and implement improved installation procedures for completing balance of Storefront.

### **3.4 PROTECTION AND CLEANING**

- A. Protection:
  - 1. Protect finish surfaces from damage during construction.
  - 2. Protect from damage of grinding, polishing, plaster, lime, acid, cement and other harmful contaminants.
- B. Cleaning:

1. Repair or replace damaged components.
2. Clean in accordance with manufacturer's instructions.
3. Remove construction debris and legally dispose off site.

**END OF SECTION**

## **SECTION 08 70 00 FINISH HARDWARE**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Door Hardware, as indicated, in accordance with provisions of Contract Documents.
- B. Notify Architect of items which will not operate properly, attain the required fire label, or where components are physically or functionally incompatible.
- C. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Americans with Disabilities Act (ADA):
    - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
  - 2. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
    - a. A156.1, Butts and Hinges.
    - b. A156.3, Exit Devices.
    - c. A156.4, Door Controls -Closers.
    - d. A156.6, Architectural Door Trim.
    - e. A156.8, Door Controls - Overhead Stops and Holders.
    - f. A156.13, Mortise Locks.
    - g. A156.16, Auxiliary Hardware.
    - h. A156.18, Materials and Finishes.
    - i. A156.21, Thresholds.
  - 3. American National Standards Institute/Steel Door Institute (ANSI/SDI).
    - a. A250.8, Specifications for Standard Steel Doors and Frames (SDI-100).
  - 4. Door and Hardware Institute (DHI).
  - 5. National Fire Protection Association (NFPA):
    - a. 101, Life Safety Code.
  - 6. Building code shall be the latest edition.
- B. Qualifications:
  - 1. Installation shall be inspected by a certified Architectural Hardware Consultant (AHC).

#### **1.3 DEFINITIONS**

- A. AHC: Architectural Hardware Consultant, certified by DHI.
- B. Installer or Applicator:
  - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  - 2. Installer and applicator are synonymous.
- C. All weather: Capable of operation from -50 to +120 DEGF.
- D. Active Leaf: Right-hand leaf when facing door from keyed side unless noted otherwise on Drawings.

#### **1.4 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Qualifications
    - a. AHC qualifications.
  3. Certification from AHC stating:
    - a. All door hardware has been reviewed by AHC and verified to be compatible with doors and frames.
    - b. All electrified door hardware has been reviewed by AHC and has been coordinated with power supply and access control system.
    - c. No submittals will be reviewed until Engineer has received AHC certification.
  4. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
  5. Schedule of all hardware being used on each door.
    - a. Number hardware sets and door references same as those indicated on Drawings.
  6. Technical data sheets on each hardware item proposed for use.
  7. Warranty information for all hardware devices having extended warranties.
- B. Informational Submittals:
1. Certifications:
    - a. Certification from AHC stating all door hardware has been provided per approved Shop Drawings, has been installed in accordance with manufacturer's recommended installation instructions and all doors have been inspected and tested and found to be in proper working order.
      - 1) Door assemblies required to swing in the direction of egress have been inspected and tested in accordance with NFPA 101.

## 1.5 WARRANTY

- A. Provide all individual manufacturers' extended warranties as advertised.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Hinges:
    - a. Hager Companies.
    - b. McKinney Manufacturing Co.
    - c. Stanley by dormakaba Holding, Inc.
  2. Locksets and latchsets:
    - a. Best Access Solutions, Inc. by dormakaba Holding, Inc.
    - b. Corbin Russwin, Inc. by ASSA ABLOY.
  3. Exit devices:
    - a. Corbin Russwin, Inc. by ASSA ABLOY.
    - b. PRECISION by dormakaba Holding, Inc.
    - c. SARGENT Manufacturing Company by ASSA ABLOY.
    - d. Von Duprin by Allegion PLC.
  4. Closers:
    - a. Corbin Russwin, Inc. by ASSA ABLOY.
    - b. LCN by Allegion PLC.
    - c. Norton by ASSA ABLOY.
  5. Door stops and holders:
    - a. Trimco.
    - b. Rockwood by ASSA ABLOY.
    - c. IVES by Allegion PLC.
  6. Overhead stops:
    - a. Glynn-Johnson by Allegion PLC.
    - b. Rockwood by ASSA ABLOY.

- c. Trimco.
- d. Rixson by ASSA ABLOY.
- 7. Weatherstripping and thresholds:
  - a. Pemko by ASSA ABLOY.
  - b. Reese Enterprises, Inc.
  - c. Zero International, Inc.
  - d. National Guard Products.
- 8. Door bolts, coordinators and strikes:
  - a. IVES by Allegion PLC.
  - b. Trimco.
  - c. Hager Companies.
  - d. Rockwood by ASSA ABLOY.
  - e. dormakaba.
- 9. Other materials: As noted.

B. Submit request for substitution in accordance with Specification Section 01 25 13.

## 2.2 MATERIALS

- A. General: As indicated in the FABRICATION Article in PART 2 of this Specification Section.
- B. Fasteners: Stainless steel or aluminum.
- C. Closers:
  - 1. Standard closer:
    - a. Shell: Aluminum or cast iron.
    - b. Arms and piston: Forged steel.
- D. Kickplates:
  - 1. Stainless steel.
- E. Thresholds: Aluminum.
- F. Overhead Stops and Wall Stops: Stainless steel or aluminum.
- G. Keys: Brass or bronze.
- H. Weatherstripping and Smoke Seals: Polypropylene, neoprene, or EPDM.
- I. Pulls and Push Plates: Stainless steel.
- J. Silencers: Rubber.

## 2.3 COMPONENTS

- A. Hinges:
  - 1. Butt hinges:
    - a. ANSI/BHMA A156.1.
      - 1) A5111: Stainless steel, full-mortise, anti-friction bearing, Grade 1.
    - b. Ball bearing.
    - c. Flat button tips.
    - d. Butt hinges:
      - 1) Hager BB1199.
      - 2) McKinney T4B3386.
    - e. Hinge size:
      - 1) Doors up to and including 46 IN wide: 4.5 IN x 4.5 IN.
      - 2) Doors over 46 IN up to and including 60 IN wide: 5 IN high x 4.5 IN.
- B. Power Transfers:
  - 1. General:
    - a. Provide power transfer appropriately sized for door and hardware scheduled.
    - b. Provide modular connectors as necessary for connection to related components.
  - 2. Concealed Power Transfer:



- a. McKinney "Electrical Power Transfer (EPT)" series.
- 3. Exposed Power Transfer:
  - a. McKinney "Door Cord" series.
- C. Mortise Locks and Latches:
  - 1. ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 1.
    - a. Meet requirements of ADA.
  - 2. Antifriction two-piece mechanical latchbolt with stainless steel anti-friction insert.
    - a. One-piece stainless steel deadbolt, minimum 1-1/4 IN x 9/16 IN thick with 1 IN throw.
    - b. 2-3/4 IN backset.
    - c. Cylinder: Brass, 6-pin, with interchangeable core.
    - d. ADA compliant thumb turn lever.
  - 3. Locking, latching and retracting mechanism and lock case:
    - a. Steel, unless noted otherwise.
      - 1) Chrome or zinc dichromate plated.
  - 4. Trim design: Corbin Russwin, Inc. "NSP".
    - a. Functions as indicated in following table in accordance with ANSI/BHMA A156.13.
  - 5. Electrified Hardware:
    - a. Provide [Power Supply,] Electrified Trim, Request to Exit or other options as necessary to coordinate with [Electric Door Assisting Device and] Access Control System.
    - b. All electric lock hardware to be 24 VDC.

MORTISE LOCK NUMBERS		
ANSI	FUNCTION	CORBIN RUSSWIN, INC.
F01	Passage	ML2010
F19	Privacy	ML2030
F05	Classroom	ML2055
F07	Storeroom	ML2057
F13	Entrance or Office	ML2065
	Electronic Lockset	ML20905 x M92

- D. Exit Devices:
  - 1. ANSI/BHMA A156.3, Grade 1.
  - 2. Single doors: Mortise [Rim].
  - 3. Pairs of doors: Concealed [Surface] vertical rods.
  - 4. Trim: Sargent "ET".
    - a. Lever operation.
    - b. Lever style: Sargent "L".
  - 5. Sargent "80 Series".
    - a. Function as indicated on Hardware Schedule.
  - 6. Electrified Hardware:
    - a. Provide [Power Supply,] Electrified Trim, Electric Latch Retraction, Request to Exit or other options as necessary to coordinate with Electric Door Assisting Device and Access Control System.
    - b. All electric lock hardware to be 24 VDC.
- E. Bolts:
  - 1. ANSI/BHMA A156.16.
  - 2. Surface bolts: Rockwood 580 Series with top and bottom strikes.
- F. Door Closers:
  - 1. ANSI/BHMA A156.4, Grade 1.
  - 2. Size door closers to comply with ANSI recommendations for door size and location.

3. Fabricate all closers with integral back check.
  4. Provide integral stop unless noted otherwise.
    - a. Do not provide integral stop at closers indicated to be installed on pull side of door.
    - b. Provide all weather fluid for all closers used in exterior doors [and where otherwise indicated].
  5. Full cover.
    - a. Manufacturer's standard plastic cover.
  6. Arms, brackets, and plates: As required for complete installation.
  7. Closers:
    - a. LCN 4040 Series or Norton 7500 Series or Corbin Russwin, Inc. DC6200 Series.
  8. Provide manufacturer's standard 10 year warranty.
- G. Door Stops:
1. ANSI/BHMA A156.16.
    - a. Wall stops: IVES WS406-CVX or WS406-CCV.
- H. Overhead Door Holders/Stop:
1. ANSI/BHMA A156.8.
  2. Provide 'hold-open' function on all stops unless noted otherwise.
    - a. Do not provide 'hold-open' function at fire rated doors.
  3. Surface mounted stops: Rockwood N14400 Series or Glynn Johnson 90 Series.
  4. Concealed stops: Rockwood N11000 Series or Glynn Johnson 100 Series.
- I. Kickplates:
1. ANSI/BHMA A156.6.
  2. 8 IN high x 2 IN less than door width.
  3. Beveled on all edges.
  1. Thickness:
    - a. Stainless steel: 0.050 IN.
- J. Thresholds:
1. ANSI/BHMA A156.21.
  2. One-piece unit.
  3. Height: 1/2 IN high maximum.
  4. Width: 4 IN [5 IN][6 IN][as noted in hardware schedule].
  5. Provide required bolt cutouts.
- K. Weatherstripping:
1. Weather seal at jambs and head:
    - a. Self-adhesive strip: Reese #797.
    - b. Color: Black. [White.]
  2. Sweep at bottom of doors:
    - a. Reese 701.
    - b. Color: Clear anodized. [Dark bronze anodized.]
  3. Weather seal astragal at meeting edges of pairs of doors:
    - a. Reese 92 each leaf.
    - b. Color: Clear anodized. [Dark bronze anodized.]

## 2.4 ACCESSORIES

- A. Silencers:
1. Hollow metal frames: Trimco 1229A or Rockwood 608.
  2. Self-adhesive silencers are not acceptable.
- B. Keying:
1. Establish keying with Owner.
    - a. Provide and set up complete visible card indexed system with key tags and control slips.
    - b. Tag and identify keys.
    - c. Provide two keys for each lock or cylinder.

- d. Master key and key in groups as directed.
  - e. Provide construction master keys for all exterior doors.
- C. Strikes:
- 1. Curved lips.
    - a. Extended lips when required.
  - 2. Furnish strike boxes.
  - 3. Appropriate for function and hardware listed.

## 2.5 FABRICATION

- A. General:
- 1. Generally prepare for Phillips head machine screw installation.
  - 2. Exposed screws to match hardware finish or, if exposed in surfaces of other work, to match finish of other work as closely as possible.
  - 3. Provide concealed fasteners unless thru bolted.
  - 4. Through bolt closers on all doors.
  - 5. Furnish items of hardware for proper door swing.
  - 6. Furnish lock devices which allow door to be opened from inside room without a key or any special knowledge.
- B. Hardware:
- 1. Fabricate hardware for fire rated openings in compliance with UL and NFPA 80.
    - a. This requirement takes precedence over other requirements for such hardware.
    - b. Provide only hardware which has been tested and listed by UL for types and sizes of doors.
  - 2. Provide following ANSI/BHMA A156.18 finishes:
    - a. Locksets, latchsets and strikes: 630.
    - b. Door pulls, push bars, push plates: 630.
    - c. Kickplates:
      - 1) Stainless steel: 630.
    - d. Exit devices: 630 where available; 626 if 630 is not available.
      - 1) Provide 630 finish on trim.
    - e. Butt hinges: 630.
    - f. Door stops, dead locks, mortise bolts, and miscellaneous hardware: 630 where available, 626 if 630 not available.
    - g. Door overhead stops: 630.
    - h. Closers: 600 prime coat with 689 finish coat, unless noted otherwise.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's installation instructions.
- 1. Perform installation by or under the direct supervision of an AHC.
- B. Provide all hardware in accordance with Building Code.
- C. Fit hardware before final door finishing.
- D. Permanently install hardware after door finishing operations are complete.
- E. Locate hardware in accordance with ANSI/SDI A250.8.
- F. Butt Hinges:
- 1. Provide non-removable pin (NRP) at:
    - a. Exterior doors.
    - b. Reverse handed doors equipped with locks.
  - 2. Quantities:
    - a. Door height 61 - 90 IN: Three.

- b. Door height 91 - 114 IN: Four.
  - c. Door height 115 - 144 IN: Five.
  - d. Doors over 48 IN wide and over 96 IN high:
    - 1) Provide top butt hinge within 6 IN of the top of the door to top of hinge.
    - 2) Provide one additional butt hinge approximately 6 IN below the bottom of the top butt hinge.
- 3. Provide power transfer as necessary where electrified lockset or exit device is specified or as otherwise indicated in Hardware Schedule.
- G. Closers:
  - 1. Mount closers on push side of doors unless noted otherwise.
- H. Provide coordinator when required by hardware specified.
- I. Overhead Stops:
  - 1. Provide overhead stop when corrosion resistant closer is specified.
  - 2. Provide concealed overhead stop on doors scheduled to receive closer mounted on pull side of door.
  - 3. Provide at interior doors not scheduled to receive a closer as follows:
    - a. Doors that swing more than 105 DEG without encountering a wall or obstruction.
      - 1) Stop shall limit swing of door from impacting wall or obstruction.
    - b. Inactive leafs of pairs of doors.
- J. Wall Mount Door Stops:
  - 1. Provide where specifically indicated on Hardware Schedule and at doors not otherwise indicated to receive:
    - a. Overhead stop.
    - b. Closer with integral stop.
- K. Floor mounted stops are not acceptable unless noted otherwise in this Specification Section.
- L. Install astragal on all pairs of UL labeled fire doors.
- M. Provide silencers for door frames.
  - 1. Hollow metal frames: See Specification Section 08 11 13.
- N. Provide weather seal, door sweep and threshold at all exterior doors and where scheduled on interior doors.
  - 1. Set thresholds in a full bed of sealant.
  - 2. Mount door sweeps on exterior face of door.
  - 3. Mount weather seal astragal at meeting edges of pairs of doors on the exterior face of the doors.
- O. Provide smoke seals on all fire rated doors.
- P. Mount kickplates on push side of doors.

### 3.2 FIELD QUALITY CONTROL

- A. Adjust and check each operating item of hardware to assure proper operation or function.
  - 1. Lubricate moving parts with lubricant recommended by manufacturer.
- B. During week prior to startup, make a final check and adjustment of all hardware items.
  - 1. Clean and lubricate as necessary to assure proper function and operation.
  - 2. Adjust door control devices to compensate for operation of heating and ventilating equipment.
- C. Inspection and Testing:
  - 1. AHC shall inspect and test all door assemblies and provide written certification that door assemblies are in proper working order.
    - a. Door assemblies required to swing in the direction of egress shall be inspected and tested in accordance with NFPA 101.

2. Submit documentation and certification of testing in accordance with the certifications paragraph in the SUBMITTALS Article in PART 1 of this Specification Section.

### **3.3 SCHEDULES**

- A. Hardware Schedule: See drawings for hardware schedule

**END OF SECTION**

## SECTION 08 81 23 EXTERIOR GLASS AND GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Furnish labor, materials, tools, equipment, and services for Exterior Glass and Glazing in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### 1.2 QUALITY ASSURANCE

- A. Glass Standards: Glazing assemblies shall meet Miami Dade NOA requirements.
  - 1. Flat glass:
    - a. ASTM C1036 Standard Specification for Flat Glass.
    - b. Float glass: Type I, Quality q3; and Class 1 unless otherwise indicated.
    - c. Figured glass: Type II, Quality q7, Form 3; and Class 1, Finish f1 and Pattern p2 unless otherwise indicated.
    - d. Provide Class 2 or 3 for tinted or integrally colored glass.
  - 2. Flat glass, heat treated (coated/uncoated):
    - a. Tempered safety glass: Conform to ANSI Z97.1 and CPSC 16 CFR 1201.
    - b. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
    - c. ASTM C1651 Standard Test Method for Measurement of Roll Wave Optical Distortion in Heat-Treated Flat Glass.
    - d. Heat strengthened glass: Kind HS, Type I, Quality q3, Class 1 and Condition A unless otherwise indicated.
    - e. Tempered glass: Kind FT, Type I, Quality q3, Class 1 and Condition A unless otherwise indicated.
    - f. Heat strengthened – tempered glass: Kind HS-FT, Type 1, Quality q3 and Condition A unless otherwise indicated.
    - g. Provide Class 2 or 3 for tinted or integrally colored glass.
    - h. Provide Condition B or C for coated glass.
    - i. Distortion Tolerances:
      - 1) Heat treated flat glass by horizontal, roller hearth process with inherent roller wave distortion parallel to bottom edge of glass as installed.
      - 2) Maximum peak to valley roller wave 0.003 IN 0.080 MM in central area and 0.008 IN 0.20 MM within 10-1/2 IN 267 MM of leading and trailing edge
      - 3) Roll Wave (horizontal) distortion to maximum 0.003 IN 0.080 MM at center of panel and 0.003 IN 0.080 MM at edges of panels as measured from peak to valley.
      - 4) Clear or low-iron glass 1/4 IN to 3/8 IN 6 MM to 10 MM thick without ceramic frit or ink:
        - a) Maximum plus or minus 100mD millidiopters over 95 PCT of glass surface.
      - 5) Maximum bow and warp 1/32 IN 0.79 MM per lineal foot.
    - j. Fully tempered glass:
      - 1) Provide heat soak testing in compliance with EN14179 including 2 HR dwell at 280 DEGC – 300 DEGC.
  - 3. Insulating Glass Units:
    - a. Insulating Glass Certification Council (IGCC), Class CBA.
    - b. ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
    - c. ASTM E2188 Standard Test Method for Insulating Glass Unit Performance.
    - d. ASTM E2189 Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.

4. NFPA 80 Standard for Fire Doors and Windows.
  5. ANSI Z97.1 Safety Glazing Materials Used in Buildings.
  6. CPSC 16 CFR 1201 Federal Safety Standard for Architectural Glazing Material.
  7. GANA Glazing Manual.
- B. Glazing Standards:
1. GANA Glazing Manual.
  2. Glazing Guidelines for Sealed Insulating Glass Units, by the Insulating Glass Manufacturers Alliance (IGMA).

### 1.3 SUBMITTALS

- A. Samples:
1. 300 MM x 300 MM 12 IN x 12 IN piece of each specified type of glass.
- B. Contract Closeout Information:
1. Warranty.

### 1.4 WARRANTY

- A. Written five (5) year warranty signed by installer to cover weather tightness of installation including air and water integrity.
- B. Written warranty signed by manufacturer or fabricator of glass units against failure.
1. Include costs associated with glass replacement and installation.
  2. Failure is defined as excessive deterioration under normal conditions, thermal failure of insulating units, or obscured vision.
    - a. Coated glass: 10 years.
    - b. Laminated glass: 5 years.
    - c. Insulating glass (vertical): 10 years.
    - d. Insulating glass (sloped): 5 years.
    - e. Reflective spandrel: 5 years.
    - f. Pyrolytic-coated, self-cleaning glass: 10 years.
    - g. Tempered glass: Heat soaked warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Insulating Glass and Insulating Spandrel Glass Fabricators:
1. Base:
    - a. Viracon
  2. Optional:
    - a. JE Berkowitz
    - b. Oldcastle
    - c. Technoglass
    - d. Trulite
- B. Other manufacturers desiring approval comply with Section 00 26 00.

### 2.2 MATERIALS

- A. Glass:
1. Comply with indicated standards.
  2. See Glass Types Schedule for listing of types.
  3. Materials specified in Glass Types Schedule are minimum acceptable products.
  4. Provide individual glass types used in fabrication of insulating units from single manufacturer.
  5. Manufacturer or fabricator determine if materials should be heat strengthened or fully tempered at non-hazardous locations that do not require safety glazing and provide accordingly.

- 6. Low-E coating:
  - a. Hardcoat.
- B. Glazing Compounds:
  - 1. Non-sag and non-staining.
  - 2. Pigmented to match frame units not requiring painting.
  - 3. Compatible with adjacent surfaces.
  - 4. For use in setting glass: Neutral-cure Silicone sealant.
  - 5. Sealant tape: Butyl rubber sealant tape or ribbon having a continuous neoprene shim.
  - 6. Gaskets:
    - a. Polyvinyl chloride or neoprene.
    - b. Extruded, flexible, of profile and hardness required to receive glass and provide a watertight installation.
- C. Installation Setting Blocks and Spacers:
  - 1. Neoprene, compatible with sealants used.
  - 2. Setting blocks: 80-90 durometer.
  - 3. Spacers: 40-50 durometer.
  - 4. Compressible filler: Closed cell jacketed rod stock of synthetic rubber or plastic foam.
- D. Insulating Glass Spacers:
  - 1. 1/2 IN 13 MM thick, nominal.
  - 2. Aluminum, desiccant filled.
    - a. Finish: Mill.
- E. Shims, clips, springs, angles, beads, attachment screws and other miscellaneous items: As indicated or required.

## 2.3 GLASS TYPES SCHEDULE

- A. See drawings for glazing types.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine framing or glazing channel surfaces, backing, stop design, and conditions under which glazing is to be installed.
- B. Field verify glass size for each opening, within tolerances and dimensions established.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Comply with GANA Glazing Manual and IGMA Glazing Guidelines for Sealed Insulating Glass Units.
- C. Do not install glass with edge damage.
- D. Install setting blocks in adhesive or sealant.
- E. Provide spacers inside and out, of proper size and spacing, for glass size, except where gaskets are used for glazing.
- F. Minimum Bite:
  - 1. 6 MM monolithic units: 10 MM.
  - 2. 25 MM insulating units: 12 MM.
  - 3. For other sizes: Refer to Table C of AAMA's Aluminum Curtain Wall Design Manual, Volume 6, Glass & Glazing.
- G. Sealant Depth: Equal to sealant width.
- H. Miter cut and bond gasket ends together at corners.



- I. Remove and replace damaged glass.
- J. Ensure that weep system in frames is not blocked by sealant.

### **3.3 CLEANING AND PROTECTION**

- A. Wash and polish glass on both faces not more than 7 days prior to final completion of work.
- B. Comply with glass manufacturer's recommendations and GANA 01-0300.

**END OF SECTION**

## **SECTION 08 90 00 LOUVERS AND VENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for work, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Aluminum Association (AA):
    - a. DAF 45, Designation System for Aluminum Finishes.
  - 2. Air Movement and Control Association (AMCA).
  - 3. ASTM International (ASTM):
    - a. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Drawing showing location of each louver or vent, indicating size and arrangement of blank-off plates if required.
  - 3. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Color chart showing manufacturer's full line of colors including exotic and special colors for color selection by Engineer.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Louvers:
    - a. Airolite Company LLC.
    - b. Construction Specialties, Inc.
    - c. Ruskin Company.
    - d. Industrial Louvers, Inc.
    - e. American Warming and Ventilating.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

#### **2.2 MANUFACTURED UNITS**

- A. Louvers:
  - 1. 4 IN deep.
  - 2. Drainable with blades at 37-1/2 DEG.
  - 3. Continuous blade appearance.
  - 4. ASTM B221 extruded aluminum, alloy 6063T5, minimum 0.081 IN thick.
  - 5. Minimum free area: 8.58 SQFT for 4 x 4 FT louver.
  - 6. Maximum pressure drop: 0.10 IN of water at 700 FPM.

7. Water penetration: 0.01 OZ/SQFT at 873 FPM.
8. AMCA certified.
9. Ruskin "ELF 375DX".
10. Insect screen:
  - a. 18-16 mesh aluminum.
  - b. Install in standard aluminum frame.
- B. Anchors, Fasteners, Reinforcing: Aluminum or stainless steel.
- C. Finish:
  1. Meet requirements of AAMA 2605.
    - a. PVDF coating with minimum 70 PCT resin content.
    - b. Color: to match existing louver colors
- D. Size: Refer to Mechanical Drawings for louver [and brick vent] size, and refer to Architectural Drawings for louver shapes.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchoring and bracing accessories as required.
- C. Seal around perimeter on exterior and interior.
  1. See Section 07 92 00.
- D. Install 0.040 IN aluminum flashing at sill to match louver [and brick vent].
  1. See Section 07 62 00.

**END OF SECTION**



DIVISION 09

**FINISHES**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 09 22 16 NON-STRUCTURAL METAL FRAMING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Non-Structural Metal Framing in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
  - 1. Member of Certified Steel Stud Association (CSSA), Steel Stud Manufacturers Association (SSMA) or Steel Framing Industry Association (SFIA).
- B. Referenced Standards:
  - 1. Refer to Section 01 42 19 Reference Standards.
  - 2. The American Iron and Steel Institute (AISI):
    - a. AISI S220 North American Standard for Cold-Formed Steel Framing – Nonstructural Members.
  - 3. ASTM International (ASTM):
    - a. ASTM C645 Standard Specification for Nonstructural Steel Framing Members.
    - b. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
    - c. ASTM C754 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
    - d. ASTM A1003 Standard Specification for Steel Sheet, Carbon, Metallic and Nonmetallic-Coated for Cold-Formed Framing Members.
- C. Gypsum Association (GA):
  - 1. GA-216 Application and Finishing of Gypsum Panel Products.
  - 2. GA-234 Control Joints for Fire-Resistance Rated Systems.

#### **1.3 SUBMITTALS**

- A. Product Data:
  - 1. Provide copies of manufacturer's specifications and installation instructions for each type of material and accessory required.
    - a. Where fire resistance classification is indicated, submit copies of nationally recognized testing laboratory listings of products proposed for use.
  - 2. Where EQ coatings are used, submit copies of nationally recognized testing laboratory results showing conformance with ASTM C653 and AISI S220.
    - a.
    - b. Include data required to show specification compliance.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Non-Structural Metal Framing:
  - 1. Base:
    - a. ClarkDietrich Building Systems
  - 2. Optional:
    - a. CEMCO Steel Framing and Metal Lath
    - b. Custom Stud Inc.

- c. Marino/WARE
- d. MBA Metal Framing
- e. MRI Steel Framing LLC.
- f. Telling Industries
- g. The Steel Network

B. Other manufacturers desiring approval comply with Section 00 26 00.

C. Products proposed for use in fire-rated assemblies:

- 1. Approved by nationally recognized testing laboratory.

## 2.2 DESIGN CRITERIA

A. Select steel studs in accordance with manufacturer's standard load tables and following design pressures and maximum deflections:

Performance Criteria		
Use Condition <sup>2</sup>	Design Pressure	Maximum Deflection
Wall enclosing stairs, elevator hoistways, and other vertical shafts	10 LBS/SF 480 Pa	L/240
Wall enclosing vestibules, ground floor lobbies, and similar spaces subject to intermittent exposure to exterior wind conditions	15 LBS/SF 720 Pa	L/240
Walls scheduled with Tile Backer Board, Moisture-Resistant, Impact-Resistant, or Abuse-Resistant Gypsum Wallboard	5 LBS/SF 240 Pa	L/360
Walls scheduled to receive Tile, lath and plaster, or veneer plaster. <sup>1</sup>		
Typical Interior Walls/Partitions (those not listed above)	5 LBS/SF 240 Pa	L/240
Interior Ceilings, Soffits and Bulkheads	5 LBS/SF 240 Pa	L/360

### Footnotes

1. Limit deflection to L/360 where wall cladding on either face is any of the following: Ceramic Tile, Stone Tile, Porcelain Tile, Thin Brick, Lath & Plaster, Simulated Masonry, Adhered Stone, Veneer Plaster and similar brittle finishes which are prone to movement induced cracking.

2. Where elements meet multiple conditions; Use most stringent Deflection and Design Pressure values.

## 2.3 MATERIALS

- 1. Minimum thickness: 30 MIL (20 GA) 0.762, except as follows:
  - a. Increase member thickness to comply with performance criteria.

B. Furring Channels:

- 1. Hat shaped sections.
- 2. Galvanized: G40 or certified equivalent.
- 3. Sizes: 7/8 IN 22 MM and 1-1/2 IN 38 MM, as indicated.
- 4. Minimum Thickness: 30 MIL (20 GA) 0.762 MM; Use heavier gauge as dictated by conditions.
- 5. Base product: Furring Channel/ Hat Channel by ClarkDietrich.

C. Z-Furring:

- 1. Z-shaped sections, attached to structural parent wall.
- 2. Galvanized: G40 or certified equivalent.
- 3. Sizes: 1, 1-1/2, and 2 IN 25, and 38, 50mm.
- 4. Thickness: 18 MIL (25 GA) 0.457 MM minimum; Use heavier gauge as dictated by conditions.
- 5. XPS foam insulation: Specified in Section 07 21 00.
- 6. Base product: Z-Furring Channel by ClarkDietrich.

- D. Accessory Items:
1. Wire Ties:
    - a. Minimum thickness: 43 MIL (18 GA) 1.09 MM soft annealed, galvanized.
  2. Track Fasteners:
    - a. Power driven type, to withstand minimum 190 LBS 86 kg shear when driven.
  3. Closure:
    - a. Continuous 30 MIL (20 GA) 0.762 MM galvanized closure angle to receive vapor retarder and vapor retarder tape.
  4. Metal Blocking:
    - a. C-shaped modified track runners.
    - b. G40 galvanized or certified equivalent.
    - c. Backing height: 6 IN 150 MM minimum.
    - d. Flange width: 1-1/4 IN 32 MM minimum.
    - e. Thickness: 30 MIL (20 GA) 0.95 MM minimum.
  5. Backing - Flat Plate:
    - a. Flat, sheet metal stock per ASTM A1008.
    - b. G40 galvanized or certified equivalent.
    - c. Thickness: 50 MIL (18 GA) 1.27 MM minimum.
  6. Anchors in Concrete:
    - a. Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing per ASTM E488 or ASTM E1512 as applicable.
    - b. Acceptable types: Cast-in-place, post-installed expansion anchors and post-installed bonded anchors.
    - c. Material: Carbon-steel components zinc plated to comply with ASTM-B633, Class Fe/Zn 5 for Class SC 1 service condition.
  7. Powder-Actuated Fasteners in Concrete:
    - a. Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E1190.
    - b. Comply with seismic design requirements where applicable.
  8. Other items including suspension wire, tie wire, attachment devices: As specified and indicated.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Examine supporting structure and conditions under which system will be installed.
- B. Correct conditions detrimental to proper installation.
- C. Installation constitutes acceptance of responsibility for performance.

### **3.2 INSTALLATION - GENERAL**

- A. Layout and install metal framing accurate to dimensions indicated in drawings.
- B. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.
  1. Gypsum Board Assemblies: Comply with additional requirements in ASTM C840 relative to framing installation.
- 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. Furring Channels:



1. Attach furring channel systems directly to parent walls.
2. Install channels at maximum 16 IN 400 MM OC.
3. Provide additional framing at openings, cutouts, corners, and control joints.
4. Space fasteners not more than 24 IN 610 MM OC, staggered on opposite flanges of furring channels.

### **3.3 WALL BACKING AND BLOCKING**

- A. Metal Wall Backing: Provide in-wall metal wall backing reinforcement where following items are mounted to interior walls and interior face of exterior walls:
  1. Crash rails, chair rails, wall bumpers, and similar wall protection devices.
  2. Contractor or Owner furnished equipment indicated to be wall mounted.
  3. Toilet accessories that do not include proprietary backing devices.
  4. Toilet partitions and lockers.
  5. Markerboards, tackboards, and chalkboards.
  6. Other wall-mounted items where backing is indicated by details or specification.
- B. Verify metal stud framing has been installed to support wall-mounted items specified in Section 05 50 10.
- C. Wood Wall Blocking: Specified in Section 06 10 53.
- D. Coordinate mounting height, location, and coverage with item to be supported.
- E. Determine material width according to item to be supported.
- F. Provide in-wall metal wall backing material to interior metal stud walls specified herein and Exterior stud walls specified in Section 05 40 00.
- G. Attachment: Minimum 2 - #10 sheet metal screws at each stud.

### **END OF SECTION**

## **SECTION 09 24 24 PORTLAND CEMENT STUCCO**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Portland Cement Stucco Wall System, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Applicator qualifications:
  - 1. Minimum 5 years experience in cement plastering work on similar size projects.
- B. ASTM International:
  - 1. ASTM C150 Portland Cement
  - 2. ASTM C206 Standard Specification for Finishing Hydrated Lime
  - 3. ASTM C926 Standard Specification for Application of Portland Cement-Based Plaster
  - 4. ASTM C979 Pigments for Integrally Colored Concrete
- C. Portland Cement Association (PCA):
  - 1. Portland Cement Plaster/Stucco Manual

#### **1.3 MOCK-UP WALL**

- A. Construct Mock-up Wall on site for Architect review.
  - 1. Minimum: 4 FT x 6 FT.
  - 2. Construct using air/water-resistive barrier, drainage mat, metal lath, reinforcing mesh, cement plaster base, accessories, cement plaster coats, color and finish texture representative of that required for the project.
  - 3. Include one outside and one inside corner.
  - 4. Include horizontal and vertical Control Joint.
  - 5. If not acceptable, construct additional sample walls.
  - 6. Mock-up Wall constitutes standard of quality for actual construction.
  - 7. Maintain Mock-up Wall during construction.
  - 8. Remove when directed.
  - 9. Do not proceed with plaster work until Mock-up Wall is approved by Architect.

#### **1.4 SUBMITTALS**

- A. Shop Drawings:
  - 1. Layout Drawings of exterior walls to receive PC Plaster, showing locations of Expansion/Control Joints.
- B. Samples:
  - 1. Three, 12 x 12 IN, samples of color and finish.
    - a. Label samples to indicate name of project, finish type, and color.
    - b. Obtain approval of Samples before construction of Mock-up Wall where specified.
- C. Mock-up Wall.
- D. Project Information:
  - 1. Manufacturer's data sheets for listed products
  - 2. Manufacturer's NFPA 285 assembly report or ICC ESR indicating compliance of stucco assembly, including continuous insulation, air/moisture barrier, and drainage mat, with requirements of NFPA 285 for use on Types I, II, III, and IV construction.
  - 3. Certification of installer qualifications

4. Meeting minutes from Preinstallation Conference
- E. Contract Closeout Information:
  1. Maintenance data.

## 1.5 WARRANTY

- A. 10 year warranty of weathertightness signed by the cement plaster manufacturer.
  1. Warranty to include the entire system: air/water-resistive barrier, drainage mat, metal lath, reinforcing mesh, cement plaster base, cement plaster, trim accessories, and other material authorized by manufacturer.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Portland Cement Stucco Wall System:
  1. Base:
    - a. Sto
  2. Optional:
    - a. LaHabra (Parex USA)
    - b. Senergy (BASF Wall Systems)

### 2.2 MATERIALS

- A. Air Barrier:
  1. Flashing as recommended by the cement plaster wall system manufacturer.
  2. Assembly air leakage: less than 0.04 CUFTM/sqft at 1.57 PSF by ASTM E2357
  3. Water Vapor Permeance: greater than 10 perms
  4. Fluid applied air barrier:
    - a. Base Product: Sto Emerald Coat.
- B. Drainage mat: three-dimensional drainage core bonded to a breathable fabric consisting of fused entangled filaments.
  1. Base Product: DrainScreen by Sto
- C. Lath and accessories:
  1. Lath: 2.5 LB/sq.yd. self-furred diamond mesh.
    - a. Galvanized, ASTM C847.
  2. Trim: casing bead, corner bead, control joint, expansion joint, etc.
    - a. Galvanized, ASTM A525 and ASTM A526.
  3. Weep screed flashing: terminate finish system and drain internal moisture.
    - a. Galvanized, ASTM A525 and ASTM A526.
  4. Mechanical Fasteners for metal lath:
    - a. Corrosion resistant screw and plates.
    - b. Attach directly to steel studs with minimum three thread penetration.
    - c. 18 GA galvanized, annealed low-carbon steel tie wire.
- D. Stucco:
  1. Base Coat:
    - a. Minimum thickness: 1/2 IN
    - b. Sto 108 Powerwall portland cement based stucco concentrate.
    - c. Washed plaster sand
  2. Scratch and Brown Coat:
    - a. Minimum thickness: 1/4 IN
    - b. Embed 4.5 OZ/sq.yd. interlaced open-weave glass fiber mesh in brown coat
    - c. Sto 108 Powerwall portland cement based stucco concentrate.
    - d. Washed plaster sand
  3. Primer:

- a. Acrylic bonder recommended by Cement Stucco System Manufacturer for specified materials.
- 4. Finish Coat - Cementitious:
  - a. Preblended portland cement plaster.
  - b. Factory-prepared products containing materials required for finish, except water.
  - c. Base Product:
    - 1) Ash Grove Pro Finish Stucco.
  - d. Color:
    - 1) Shall match the colors of the existing facility as indicated on the drawings.
  - e. Texture:
    - 1) Smooth trowel
- 5. Acrylic Finish Coat:
  - a. LaHabra Platinum Plus by Parex
  - b. Powerwall by Sto
  - c. Texture: Smooth
  - d. Color: Shall match the colors of the existing facility as indicated on the drawings.
- E. Reveals: Specified in Section 07 62 00.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Examine surfaces to receive plaster.
  - 1. Check lath and furring for completeness and soundness.
  - 2. Ensure that reglets have been installed.
  - 3. Correct unsatisfactory conditions.
  - 4. Start of work constitutes acceptance of substrates and responsibility for performance.

### **3.2 PREPARATION**

- A. Clean surfaces and remove loose and deleterious substances.
- B. Protection:
  - 1. Protect adjacent finished surfaces.
  - 2. Maintain protection until completion of plastering.

### **3.3 PREPARATION – SOLID SUBSTRATES**

- A. Definition of Solid Substrates:
  - 1. Refers to direct application of new plaster to CMU, cast-in-place concrete, brick masonry, existing plaster, and similar materials.
- B. High-suction substrates:
  - 1. Examples: Ordinary CMU, porous clay masonry or tile, lightweight concrete.
  - 2. Wet substrate with fine water spray to produce a uniformly damp surface.
  - 3. Apply Surface-applied Bonding Agent to substrate as recommended by manufacturer.

### **3.4 INSTALLATION**

- A. General:
  - 1. Make interior corners and angles square.
  - 2. Finish external corners flush with corner beads.
  - 3. Built-in items, where plaster is not terminated at metal by casing beads:
    - a. Cut basecoat free before plaster sets.
  - 4. Protect contiguous work from rusting, damage or soiling as a result of plastering operations.
  - 5. Protect plaster against climatic conditions as specified by ASTM-C926 and as required to prevent freezing or uneven and excessive evaporation.
- B. Cold weather plastering:
  - 1. Do not use frozen materials.

2. Do not use antifreeze compounds, or products containing Calcium Chloride, alcohol or ethylene glycol.
  3. Do not apply cement plaster to frozen surfaces or surfaces containing frost.
  4. Do not apply plaster when ambient temperature is less than 40 DEGF.
- C. Hot weather plastering:
1. Cover wall opening with plastic film when building is subject to hot, dry winds or day-to-night temperature differentials more than 20 DEGF.
  2. Protect plaster from uneven and excessive evaporation during hot, windy, and dry weather.
    - a. Moisten plaster and cover with a single sheet of polyethylene plastic.
  3. Moist cure basecoat if ambient temperature is more than 75 DEGF.
    - a. Moist cure for 48 HRS after application of coats.
    - b. Moist curing is required at the start and end of work day.
    - c. Moist curing is not required when ambient RH is higher than 70 PCT.
- D. Control Joints (CJ):
1. Lay out Control Joints before work starts, as they may affect appearance, framing, sheathing, and lathing procedures.
  2. Cut lath behind control joints to ensure that stresses which develop in individual panels are isolated from adjacent panels.
  3. Locations: Locate where indicated on Drawings, where prudent, and as described below:
    - a. Panels should be relatively square.
      - 1) Avoid T, L, and X-shaped panels.
    - b. No panel should exceed 5.5 M 18 FT in length.
    - c. Panel dimensions shall not exceed a 2-1/2:1 ratio.
    - d. Panels shall not exceed the following areas:

Orientation	Maximum Area
<b>Walls</b>	13.4 M2 144 FT2
<b>Ceilings and Soffits</b>	9.3 M2 100 FT2

- e. Install Control Joints at surface penetrations, (windows, doors, etc.) and at areas of structural stress.
- E. Expansion Joints (EJ):
1. Install Expansion Joints where dissimilar substrates join.
  2. Install where indicated.
- F. Wherever permanent grounds are too far apart to serve as guides for finishing, provide plaster screeds and establish true surface of screeds before screeds are set.
1. Keep grounds clean.
  2. Finish plaster level with grounds.
- G. Metal Door Frames:
1. Grout hollow metal frames for doors and other openings using specified base coat.
  2. Plaster flush with metal frames:
    - a. Cut basecoat free before plaster sets.
    - b. Groove finish coat at junctures with metal.
  3. Apply greater thickness if indicated.
  4. For conditions not listed, refer to PCA Portland Cement Plaster Manual.

### 3.5 INSTALLATION – DIRECTLY OVER MASONRY

- A. Masonry surfaces:
1. If smooth and in good condition: Apply at least two coats of cement plaster.

2. If surface is not in good condition: Mechanically attach metal lath and install plaster accordingly.
3. Where minor irregularities occur on a masonry wall which is otherwise in good condition: Patch and/or apply metal lath to portions of substrate wall that has offsets and irregularities greater than 1/4 IN to avoid the creation of weakened planes which might lead to cracking in the plaster finish.
4. Masonry surface to be clean and in condition for a direct bond of cement plaster.
5. Pre-wet the wall before plastering.
6. Apply a Surface-applied Bonding Agent to masonry surfaces per manufacturer's standards.
  - a. Exception: Apply a Dash Coat agent to exceptionally dense masonry surfaces.
7. Minimum thickness of Base Coat:
  - a. Refer to Table 1 above.
8. Cement plaster must be applied with sufficient force to develop full adhesion between plaster and the substrate.
9. Cement plaster Base Coat must be rodded off to a true flat plane.
10. Even and level with screeds.
11. Follow this by wood floating or darbying the surface.
12. Fill voids and dress surface for Finish Coat.

### 3.6 INSTALLATION – DIRECTLY OVER CONCRETE

- A. Concrete surfaces:
  1. Must be free of dust, loose particles, oil, and other foreign matter, which would affect a bond of cement plaster to concrete.
  2. If smooth and in good condition: Apply at least two coats of cement plaster.
  3. If surface does not meet these requirements: Mechanically attach metal lath and install accordingly.
  4. Where minor irregularities occur on a concrete wall which is otherwise in good condition: Patch and/or apply metal lath to portions of substrate wall that has offsets and irregularities greater than 1/4 IN to avoid the creation of weakened planes which might lead to cracking in the plaster finish.
- B. Apply a Surface-applied Bonding Agent to concrete surface per manufacturer's standards.
- C. Minimum thickness of Base Coat:
  1. Refer to Table 1 above.
- D. Test bond of cement plaster to concrete surfaces.
- E. Cement plaster must be applied with sufficient force to develop full adhesion between plaster and the substrate.
- F. Cement Plaster Base Coat finishing:
  1. Even and level with screeds.
  2. Follow by wood floating or darbying the surface.
  3. Fill voids and dress surface for Finish Coat.

### 3.7 APPLICATION – FINISH COAT

- A. General:
  1. Cure Base Coats as prescribed by Building Code and ASTM C926.
  2. Finish to be applied so that there are no scaffold lines or other marks due to the application.
  3. Follow manufacturer's recommendations for mixing and application.
  4. Match approved Texture and Color as selected.
- B. Cementitious Finish Coats:
  1. Apply to a minimum thickness of 1/8 IN or as indicated by Table 1.
  2. Apply continuously, and in one operation to the entire wall area.
  3. A wet edge must be maintained.
- C. Elastomeric Topcoat:

1. Apply in accordance with manufacturer's instructions.
  - a. Minimum Dry Film Thickness: 16 to 20 mils.

### **3.8 FIELD QUALITY CONTROL**

- A. Determine most effective procedures for curing and time lapse between coats, based on climatic and job conditions.
- B. Tolerances:
  1. Complete plasterwork such that the deviation from true plane (exclusive of texture) is no greater than 1/8 IN in 10 FT, as measured from a straight edge placed in any location on the surface.
- C. Plaster that is cracked or crazed will not be accepted.
- D. Remove and replace unacceptable plaster and base.

### **3.9 REPAIR AND CLEANING**

- A. Cut, patch, repair and point up plaster as required.
  1. Repair cracks and indented surfaces by moistening plaster and filling with new material.
  2. Trowel or tamp flush with adjoining surfaces.
  3. Point up finish plaster surfaces around items that are built into or penetrate plaster.
- B. Remove misplaced plaster from surfaces not scheduled to be plastered.
  1. Repair surfaces which have been stained, marred or damaged during plastering work.
  2. When plastering is completed, remove unused materials, containers and equipment.
  3. Clean floors and other surfaces of plaster debris.
  4. Leave broom clean.
- C. Clear plaster remnants from CJ's, EJ's and Reveals etc.

**END OF SECTION**

## **SECTION 09 29 00 GYPSUM BOARD**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Rough Carpentry, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - b. C475/C475M, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
    - c. C840, Standard Specification for Application and Finishing of Gypsum Board.
    - d. C1047, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
    - e. C1396/C1396M, Standard Specification for Gypsum Board.
    - f. D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
  - 2. Gypsum Association (GA):
    - a. GA-214, Recommended Levels of Gypsum Board Finish.
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. Building Materials Directory.
    - b. Fire Resistance Directory.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Drawings of unusual conditions.
    - a. Control joint layout.
  - 3. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
  - 4. Manufacturer's adhesive, joint treatment compound and tape recommendations.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Gypsum board and accessories:
    - a. American Gypsum.
    - b. Georgia-Pacific Gypsum LLC.
    - c. National Gypsum.
    - d. USG Corporation.
  - 2. Gypsum board suspension system:
    - a. Armstrong Ceiling and Wall Solutions.



- b. Rockfon.
- c. USG Corporation.

B. Submit request for substitution in accordance with Specification Section 01 25 13.

## 2.2 MATERIALS

- A. General:
  - 1. Provide UL Listed materials in fire-resistant rated construction.
  - 2. Furnish in lengths as long as practicable.
- B. Gypsum Board (GB):
  - 1. ASTM C1396/C1396M.
  - 2. Thickness: 5/8 IN unless noted otherwise.
  - 3. Edges: Tapered.
  - 4. Fire-rated board: Type X.
  - 5. Water-Resistant Gypsum Board (WRGB):
    - a. Water-resistant core and facers.
      - 1) Smooth face for finishing similar to standard gypsum board.
    - b. Mold-resistant: ASTM D3273.
    - c. USG "Sheetrock Mold Tough".
- C. Abuse Resistant Panels (ARP):
  - 1. ASTM C1278/C1278M.
  - 2. ASTM E119, Flame Spread: 5.
  - 3. ASTM E84, Smoke Developed: 0.
  - 4. Mold-resistant: ASTM D3273.
  - 5. Thickness: 5/8 IN.
  - 6. Edges: Tapered.
  - 7. USG "Fiberock Aqua-Tough AR."
- D. Adhesive: As recommended by board manufacturer.
- E. Joint Treatment Compound:
  - 1. ASTM C475/C475M.
  - 2. Recommended by manufacturer for specified board type and location.
  - 3. Do not use self-adhesive fiber mesh tape.
- F. Joint Tape:
  - 1. ASTM C475/C475M.
  - 2. Recommended by manufacturer for specified board type and location.

## 2.3 ACCESSORIES

- A. Trim:
  - 1. ASTM C1047.
  - 2. Galvanized: ASTM A653/A653M G-60, unless noted otherwise.
  - 3. Corner bead:
    - a. Standard type with perforated flanges.
    - b. ClarkDietrich "#103 Deluxe Corner Bead".
  - 4. Casing and trim bead:
    - a. ClarkDietrich "#200-A Metal U-Trim.
  - 5. Control and expansion joints:
    - a. ClarkDietrich "#093 Zinc Control Joint."
- B. Fasteners:
  - 1. Gypsum board:
    - a. Self-drilling Type S, corrosion-resistant bugle head screws.
    - b. Provide stainless steel fasteners in wet areas.
- C. Tie Wire and Suspension Wire:
  - 1. Galvanized, soft annealed 12 GA minimum.

2. Use soft stainless steel wire of same gage in all wet areas and/or exterior areas.
- D. Gypsum Board Suspension System:
  1. Direct hung factory fabricated heavy duty rated, single web system.
  2. Electro-galvanized.
  3. Fire rated system, UL listed.
  4. Chicago Metallic "Fire Front 650 Drywall Furring System."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General:
  1. Verify that metal stud framing has been installed plumb, true, and in accordance with the Contract Documents.
  2. Install ceiling suspension system in accordance with manufacturer's recommendations.
  3. Install gypsum board in accordance with ASTM C840.
  4. Install board in fire-rated construction in accordance with UL requirements.
    - a. Self-adhesive applied fire rated tape is not acceptable for use on board joints in fire rated walls.
    - b. Tape all joints using conventional fire rated joint tape and joint treatment compound.
  5. Erect all board vertically with edges over supporting members.
    - a. See Specification Section 09 22 16 non-structural metal framing.
  6. Secure to each support or framing member with screws.
    - a. Provide fasteners of sufficient length to penetrate framing member or stud not less than 3/8 IN.
  7. In curved wall or ceiling applications use 1/4 IN thick board specifically designed for use in radius construction.
    - a. Apply in multiple layers as required to meet minimum drywall thickness specified.
  8. In areas having gypsum board ceilings and walls, install ceiling first.
  9. Bring boards into contact, but do not force into place.
  10. Fit neatly and carefully.
  11. Stagger edge joints on opposite side of a partition so they occur on different framing members.
  12. Hold board in firm contact with support while fasteners are being driven.
  13. Proceed with attachment from center of board toward ends and edges.
  14. Scribe board prior to cutting.
  15. Where gypsum board abuts concrete, masonry, metal deck, exterior doors and windows, or other dissimilar material; provide 3/8 IN joint between edge of gypsum board and abutting material.
    - a. Provide continuous casing bead trim on edge of board.
    - b. Seal joint with sealant and backer rod.
    - c. See Specification Section 07 92 00 for sealant.
  16. Use water-resistant gypsum board (WRGB) in wet locations not scheduled to receive tile finish or abuse resistant panels (ARP).
- B. Installation:
  1. Set fasteners between 3/8 and 1/2 IN from edges and 2 IN in from board corner.
    - a. Space maximum of 12 IN on center at edges and in field of board.
    - b. Where board butts at wall/ceiling juncture, hold fasteners back 6 IN from edges.
    - c. Space fasteners closer if required by UL.
  2. Where two layers of gypsum board are required:
    - a. Base layer: Install per single layer system procedures.
    - b. Finish layer: Install per single layer system but stagger joints not less than one support from the base layer.
  3. Install fasteners, in gypsum board, so that head rests in a slight dimple without cutting face paper or fracturing core or as recommended by board/panel manufacturer.

4. Install screws, in cement backer board, flush with board surface.
  - a. Do not countersink screws.
- C. Control Joints:
  1. Install prefabricated control joints to provide following maximum unjointed lengths or areas:
    - a. Partitions: 30 FT, maximum straight run, and at lock side of jamb from head of each door opening to top of partition.
    - b. Ceilings:
      - 1) 50 FT maximum in one direction,
      - 2) At change of direction or irregular shapes.
      - 3) Ceiling area: 2500 SQFT, maximum.
  2. Where control or expansion joints occur in fire or sound rated assemblies, install suitable backing material to maintain required rating.
  3. Where a partition or ceiling abuts a structural element or dissimilar wall or ceiling, install corner bead, casing bead or other trim as required.
- D. Board Finishing:
  1. Securely attach continuous corner beads to all external corners in accordance with manufacturer's recommendations.
  2. Provide the following minimum levels of gypsum board finish in accordance with GA-214.
    - a. Areas exposed to view:
      - 1) Surfaces to receive vinyl wall covering: Level #4.
      - 2) Surfaces to receive painted finish: Level #5.
    - b. Areas not exposed to view:
      - 1) Fire rated partitions: Level #2 unless a higher grade of finish is required by UL.
      - 2) Non-fire rated partitions: Level #2.
    - c. Provide additional coats of joint compound as required to completely conceal joints, fasteners and accessories.
      - 1) Joint photographing will not be acceptable.
  3. Sand each coat to remove excess joint compound.
    - a. Avoid roughing paper facing on board.
  4. Finish surface shall be smooth and free of tool marks and ridges.
  5. Prime gypsum board surfaces in accordance with Specification Section 09 91 10.
    - a. After primer has been applied, inspect surfaces and repair and refinish all areas which show defects.
  6. Refer to ASTM C840 for additional finishing requirements.

## END OF SECTION

## **SECTION 09 30 00 PORCELAIN TILE**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Tile, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
  - 1. Minimum ten (10) years of experience in manufacture of tile, setting and grout materials.
- B. Installer Qualifications:
  - 1. Specializing in tile work having minimum of five (5) years successful documented experience with work comparable to that required for this Project.
- C. Single Source Responsibility:
  - 1. Obtain each type and color tile material required from single source.
  - 2. Provide compatible materials for tile system.
- D. Certifications:
  - 1. Submit Master Grade Certificate for each type of ceramic, quarry, and paver tile in accordance with requirements of ANSI A137.1.
  - 2. Submit manufacturer's certifications that mortars, adhesives, and grouts are suitable for intended use.
- E. Tile Council of North America (TCNA):
  - 1. Handbook for Ceramic, Glass and Stone Tile Installation, latest edition.
- F. Ceramic Tile Institute of America (CTIOA).
- G. ASTM International (ASTM):
  - 1. ASTM C373 Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiterware Products.
  - 2. ASTM C623 Young's Modulus, Shear Modulus, and Poisson's Ratio for Glass and Glass-Ceramics by Resonance.
  - 3. ASTM C627 Robinson Floor Test for Tile Service Level.
  - 4. ASTM D4068 Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane.
  - 5. ASTM D4551 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane.
  - 6. ASTM E90 and ASTM E413 for STC (Sound Transmission Class).
  - 7. ASTM E492 and ASTM E989 for IIC (Impact Insulation Class) – Sound Deadening Underlayments.
- H. American National Standards Institute (ANSI):
  - 1. ANSI A108.5 Installation of Ceramic tile with Dry-Set Portland Cement or Latex-Portland Cement.
  - 2. ANSI A108.10 Installation of Grout in Tilework.
  - 3. ANSI A108.13 Installation of Membranes for Thin-Set Ceramic Tile.
  - 4. ANSI A108.17 Installation of Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone.
  - 5. ANSI A118.1 Standard Dry-Set Cement Mortars.

6. ANSI A118.3 Chemical Resistant, Water-Cleanable, Tile-Setting and-Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive.
7. ANSI A118.4 Modified Dry-Set Cement Mortar.
8. ANSI A118.7 High Performance Cement Grouts.
9. ANSI A118.10 Load-Bearing, Bonded Waterproofing Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
10. ANSI A118.12 Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installation.
11. ANSI A118.15 Improved Modified Dry-Set Cement Mortars.
12. ANSI A136.1 Organic Adhesives for Installation of Ceramic Tile.
13. ANSI A137.1 Ceramic Tile.

### 1.3 SUBMITTALS

- A. Shop Drawings:
  1. Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, movement joints, thresholds, ceramic accessories, and setting methods and details.
- B. Samples:
  1. Three full size samples of each tile specified in Drawing I-001 Interior Notes and Finish Legend.
  2. Grout: Submit manufacturer's full range of standard and designated color samples for each type for Architect's selection.
  3. Grout: Submit samples mounted in 6 IN long metal channels for each type and color specified.
- C. Project Information:
  1. Installation methods.
  2. Manufacturer's Certificate: For each shipment, type and composition of tile provide a Master Grade Certificate signed by manufacturer and installer certifying products meet or exceed specified requirements of ANSI A137.1-2012.
- D. Contract Closeout Information:
  1. Maintenance Data:
    - a. Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.
    - b. See Section 01 78 23.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Porcelain Tile:
  1. Base:
    - a. As specified on drawings.
- B. Accessories:
  1. Base:
    - a. Schluter Systems LP.
  2. Option:
    - a. Custom Building Products.
- C. Other manufacturers desiring approval comply with Section 00 26 00.

### 2.2 DESIGN CRITERIA

- A. Ceramic Tile:
  1. Comply with ANSI A137.1 American National Standard Specifications for Ceramic Tile for types, compositions, and grades of tile indicated.

2. Furnish tile complying with Standard Grade requirements unless otherwise indicated.
  3. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- B. Colors, Textures, and Patterns:
1. Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with following requirements:
    - a. Match Architect's sample.
- C. Factory Mounting:
1. Provide back face or edge mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.
  2. Do not use back mounted or edge mounted tile assemblies for swimming pools, exterior applications or wet areas.
- D. Grout Release:
1. Factory applied temporary protective coating.
  2. Provide where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with a continuous film of petroleum paraffin wax, applied hot.
  3. Do not coat unexposed tile surfaces.

## 2.3 MATERIALS

- A. Porcelain Tile:
1. Acceptable Manufacturer: As specified on Drawing .
  2. Porcelain Tile: Porcelain based, impervious unglazed ceramic, through body color.
- B. Trim:
1. Provide necessary caps, stops, returns, trimmers and other shapes to complete installation.
  2. Color and finish to match adjacent tile unless shown otherwise.
  3. Ceramic Trim:
    - a. Straight Base: Bullnose top edge. Align joints and set on top of floor tile.
    - b. Cove Base: Bullnose top edge. Align joints and set flush with floor tile.
    - c. Cove Base: Square top edge. Align joints and set flush with floor tile.
    - d. Stair Tread: Non-slip with integral nosing.
- C. Mortar, Grout, and Adhesive Manufacturer:
1. Setting materials: As required by installation Method, See Part 3.
- D. Mortar – Thick Set
1. Portland Cement Mortar with Latex Additive:
    - a. Portland Cement: ASTM C150, Type I, from one source only, non-staining and non-air-entraining.
- E. Penetrating Sealer:
1. Water-based sealer capable of repelling dirt, oil and stains from tile and grout surfaces.
  2. Low odor, pH-neutral and non-abrasive.
  3. Vapor open, non-film forming.
  4. Stain Resistance per Ceramic Tile Institute CTI-072: Excellent.
  5. Compatible with tile types scheduled.
  6. Aqua Mix Sealer's Choice Gold Penetrating Sealer by Custom Building Products or Ultracare Penetrating Plus Stone, Tile, & Grout Sealer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.
- B. Verify concrete floor surfaces are suitable for tile installation.
  - 1. Firm, dry, clean and free of oily or waxy films, mortar and soil.
  - 2. Grounds, anchors, plugs, hangers, bucks, electrical and mechanical work in or behind tile installed.
  - 3. Coordinate installation with requirements of Section 07 16 04 Concrete Floor Moisture Testing, and Section 07 16 05 Water Vapor Emission Control System.
  - 4. Verify limits of moisture and alkalinity are within levels tolerated by Tile manufacturer and setting materials manufacturer.
  - 5. Verify areas to receive tile installed by thin bed method have wood float finish, are true within 1/4 IN in 10 FT 6 MM in 3 M and are pitched to drains where required.
- C. Correct unsatisfactory conditions and proceed with installation only after substrate deficiencies have been corrected and surfaces are acceptable.
- D. Start of work constitutes acceptance of surfaces, and waiver of claim that surfaces are unsuitable.

### 3.2 PREPARATION

- A. Prepare surfaces in accordance with manufacturers' instructions for setting materials or additives used.
- B. Acid based cleaners are not permitted.
- C. Completely remove curing compounds or other substances that would interfere with proper bond of setting materials.
- D. Do not seal substrate unless required by manufacturer.
- E. Prime substrate when required by manufacturer.
- F. Factory Blending:
  - 1. Blend tile in factory and package accordingly so tile are uniform in color range as those throughout packaging and match approved samples.
  - 2. If not factory blended, return to manufacturer or blend tiles at project site before installing.
- G. Field Applied Grout Release product, Temporary Protective Coating:
  - 1. Petroleum paraffin wax or proprietary grout release formulation.
  - 2. Provide where specified or required to prevent adhesion or staining of exposed tile surfaces by grout.
  - 3. Precoat exposed surfaces of tile with continuous film of temporary protective coating.
  - 4. Do not coat unexposed tile surfaces.

### 3.3 INSTALLATION

- A. Membrane:
  - 1. Install membrane with products or methods approved in writing by membrane manufacturer.
  - 2. Flash membrane to cure prior to setting tile.
  - 3. Do not allow construction traffic on membrane.
- B. Tile Installation, General:
  - 1. Install tile materials in accordance with ANSI A137.1-2012, ANSI and TCNA specifications, and TCNA Handbook for Ceramic Tile Installation, with exception of more stringent requirements of manufacturer or these Specifications.
  - 2. Cut and fit tile tight to penetrations, protrusions and vertical interruptions and seal.
    - a. See Section 07 92 16.
  - 3. Form corners and bases neatly.
  - 4. Install ceramic cove base in accordance with TCNA "Flush" style.
    - a. TCNA "Thin-Lip" style installation is not allowed.
  - 5. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size.

6. Ensure nominal grout centerlines are straight.
  7. Make joint watertight, without voids, cracks, excess mortar, or grout.
  8. Prepare surface, fit, set, bond, grout and clean in accordance with applicable requirements of ANSI standards and Tile Council of North America.
- C. sGrouting:
1. Allow tiles to set before grouting.
  2. Install in accordance with grout manufacturer's recommendations and ANSI A108.10.
  3. Clean excess grout from surface as work progresses.
  4. Cure after grouting by covering with kraft or construction paper for 72 HRS.
  5. Install sealant in vertical wall joints at interior corners.
- D. Movement Joints:
1. Comply with TCNA EJ171.
  2. Coordinate with Drawings.
  3. Locate movement joints where indicated.
  4. Where not indicated, locate movement joints directly over following substrate conditions:
    - a. Changes in substrate material.
    - b. Over control joints, expansion joints and seismic joints in substrate.
    - c. Over construction joints in substrate.
    - d. At junctures where floors meet walls and other restraining elements such as curbs, columns, bases, and wall corners.
    - e. At other locations recommended by TCNA EJ171 Movement Joint requirements.
  5. Locate additional movement joints per following:
    - a. Exterior: 12 FT 3.66 m.
    - b. Interior: 25 FT 7.6 m.
    - c. Interior, where exposed to direct sunlight or moisture: 12 FT 3.66 m.
  6. Joint Width: In accordance with TCNA EJ171.
  7. Rake or cut control joints through setting bed to supporting slab or structure.
  8. Maintain joints free of mortar.
  9. Fill joints with self-leveling polyurethane sealant and backing material.
    - a. See Section 07 92 16.
  10. Provide sealant material at items penetrating tile work, unless otherwise indicated.
  11. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
    - a. Seal tile to outlets, piping and other penetrations.
  12. Fill joints around water closets with white silicone sealant.
    - a. See Section 07 92 16.
  13. Use manufacturer's expansion joint flashing when covering expansion joints with waterproof or crack isolation membranes.
- E. Penetrating Sealer:
1. Surface Preparation:
    - a. Verify tile and grout are fully cured.
    - b. Verify surfaces are dry, clean and free of waxes, sealers and finishes.
    - c. Test product in obscure area to produce desirable results.
  2. Apply Penetrating Sealer to tiled surfaces, unless otherwise noted.
    - a. Application of penetrating sealer is not necessary where epoxy grouts are used.
    - b. Apply in accordance with Manufacturer's instructions.
  3. Test after 2 HRS by applying drops of water on surface.
    - a. If water penetrates, apply an additional coat of sealer.
  4. Remove visible residue within 60 minutes after application.

### 3.4 CLEANING

- A. Perform cleaning while mortar is fresh before hardening on surfaces.
- B. Wash tile diagonally across joints.
- C. Polish with clean dry cloth.



- D. Remove grout haze following recommendation of mortar additive manufacturer.
- E. Remove residual waxes or grout release agent, temporary protective coatings, by method recommended by coating manufacturer.
  - 1. Confirm acceptability with brick and grout manufacturer.
  - 2. Trap and remove coating to prevent it from clogging floor drains.

### **3.5 PROTECTION AND REPAIR**

- A. Prohibit traffic on floor finish for 72 HRS after installation.
- B. Where temporary use of new floors is unavoidable, supply large, flat boards or plywood panels for walkways over kraft paper.
- C. Replace broken, cracked, chipped, stained, or damaged tile.

### **END OF SECTION**

**SECTION 09 51 00**  
**ACOUSTICAL CEILINGS (ACT)**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Acoustical Ceiling Systems (ACT) in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

**1.2 QUALITY ASSURANCE**

- A. ASTM International (ASTM):
  - 1. ASTM A641/A641M Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
  - 2. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
  - 3. ASTM C635/C635M Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panels Ceilings.
  - 4. ASTM C636/C636M Standard Specification for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
  - 5. ASTM E488/E488M Standard Test Methods for Strength of Anchors in Concrete Elements.
  - 6. ASTM E580/E580M Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions
  - 7. ASTM E1190 Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members
- B. Site Classification and Seismic Design Categories as defined in the International Building Code.

**1.3 SUBMITTALS**

- A. Product Data:
  - 1. Manufacturer's product data that products comply with properties indicated on Drawings.
- B. Samples:
  - 1. Three samples of each type of tile listed on drawings.
- C. Contract Closeout Information:
  - 1. Maintenance data.
    - a. See Section 01 78 23.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Steel Suspension Systems:
  - 1. Base:
    - a. Armstrong World Industries.
  - 2. Optional:
    - a. USG Corporation
    - b. Rockfon
- B. Acoustical Ceiling Tile:
  - 1. Base:
    - a. As noted for individual types in Drawing I-001 Interior Notes and Finish Legend.
- C. Other manufacturers desiring approval comply with Section 00 26 00.

**2.2 MATERIALS**

- A. Acoustic Suspension Systems:
  - 1. Heavy duty systems, ASTM C635.
  - 2. Main runner jointing by spliced, interlocking ends, tab locks, pin locks, or other suitable connections.
  - 3. Cross runners interlocking with main runners.
  - 4. Include components and accessories necessary resist seismic loads and dead loads of items such as light fixtures and air diffusers.
  - 5. Hanger Wire:
    - a. Pre-stretched, with a yield stress load of at least 5 times design load, but not less than 0.106 IN (12 GA) 2.7 MM.
    - b. Utilize continuous lengths, without kinks and splices.
    - c. Galvanized Steel:
      - 1) Galvanized, soft annealed steel wire conforming to ASTM A641/A641m.
    - d. Stainless Steel:
      - 1) Type 304, soft annealed steel wire conforming to ASTM A641/A641M.
      - 2) Use where aluminum ceiling grid is specified.
  - 6. Attachment Devices:
    - a. Anchors in Concrete:
      - 1) Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing per ASTM E488/A488M or ASTM E1512.
      - 2) Acceptable types: Cast-in-place, post-installed expansion anchors and post-installed bonded anchors.
      - 3) Material: Carbon-steel components zinc plated to comply with ASTM B633, Class Fe/Zn 5 for Class SC 1 service condition.
    - b. Power-Actuated Fasteners in Concrete:
      - 1) Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E1190.
  - 7. Suspension System Types:
    - a. GR-1: Exposed grid, non-rated:
      - 1) Description: Galvanized, double web steel, main and cross runners.
      - 2) Face width: 15/16 IN 24 MM.
      - 3) Base Product:
        - a) Prelude XL, by Armstrong.
      - 4) Finish on exposed surfaces: Smooth, flat white.
- B. Acoustical Ceiling Tile:
  - 1. Scheduled finishes to be factory applied.
  - 2. Class A incombustible units.
  - 3. Fire rated units (when used): UL labeled.
  - 4. Edges uniformly fabricated, true, square.
  - 5. Sizes as required to fit scheduled suspension system.
  - 6. Standard tile/panel size: See Reflected Ceiling Plan.
  - 7. Concealed spline style: Edges kerfed for splines.
  - 8. Aluminum facing: Minimum 0.010 IN 0.25 MM thick aluminum sheet with white baked enamel or vinyl coating.
  - 9. Foil facing: Enhanced aluminum foil with white vinyl coating.
  - 10. .

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Verify suitability of substrate to accept installation.
- B. Examine installation site for irregularities having effect on quality and execution of work.
- C. Consult other trades involved before start of ceiling work, to determine areas of potential interference
- D. Do not start installation until interferences have been resolved.
- E. Installation constitutes acceptance of responsibility for performance.

### 3.2 PREPARATION

- A. Coordinate ceiling layout with sprinkler head spacing and work penetrating acoustical ceiling systems.
- B. Tolerances:
  - 1. Comply with ASTM C635/C635M Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  - 2. Deviation from level plane: 1/8 IN in 10 FT 3 MM in 3 M with no load applied maximum.
  - 3. Bow: 1/32 IN in 2 FT 0.8 MM in 610 MM maximum.
  - 4. Camber: 1/32 IN in 2 FT 0.8 MM in 610 MM maximum.
  - 5. Twist: 1 degree in 2 FT 1 degree in 610 MM maximum.

### 3.3 INSTALLATION

- A. Suspension System:
  - 1. Install suspension system in accordance with manufacturers' instructions.
  - 2. Grid layout:
    - a. See Reflected Ceiling Plans.
    - b. Install grid based on electrical lighting fixture layout indicated in Electrical Drawings, unless otherwise indicated,
    - c. Acoustical panel dimension at perimeter walls: Not less than 6 IN 150 MM.
    - d. In case of conflict notify Architect.
  - 3. Install grid square with room and with grid or acoustical panel center lines coinciding with center lines of room, each direction.
  - 4. Intersections between main tees and cross tees:
    - a. Butt cut and notch as required.
  - 5. Wall angles:
    - a. Install wall angles or moldings where ceilings meet walls, partitions, vertical elements, and other types of ceilings or ceiling fixtures.
      - 1) Secure angles to wall construction at stud locations.
        - a) Maximum spacing from terminal ends: 3 IN 76 MM.
        - b) Draw fasteners tight against vertical surfaces.
      - 2) Level tolerance: not more than 1 IN 1000.
      - 3) Miter cut inside and outside corners.
      - 4) Install with leg supporting bottom flange of runners.
  - 6. Hanger wires:
    - a. Provide hangers and inserts necessary to support ceiling suspension systems and ceiling dead loads.
    - b. Coordinate location and alignment with work of other trades.
    - c. Install hanger wires plumb to main tees and cross tees.
      - 1) Do not suspend any part of suspension system from ducts, pipes, conduit, cable tray or equipment.
      - 2) Provide supplementary rough suspension system where necessary to support ceilings beneath pipes, ducts, equipment, cable trays.
      - 3) Splay hangers no greater than 30 DEG from vertical to avoid obstructions or other conditions that prevent plumb, vertical installation.
      - 4) Offset horizontal forces by bracing or counter-splaying.

- d. Space hangers to prevent eccentric deflection and rotation due to loads from items in or on ceiling
    - 1) Provide supplemental hangers to support lighting fixtures and within 6 IN 150 MM from end of main runners and fixtures which exceed manufacturer's published load data.
    - 2) Do not bear runners on walls or partitions.
  - 7. Main runners:
    - a. Utilize wall angles to align and receive terminal ends of main tees without transferring load to wall angle.
    - b. Space main tees as indicated to receive lay-in panels and fixtures.
    - c. Support terminal ends of main tees by wires located within 6 IN 150 MM from boundary walls.
  - 8. Cross runners:
    - a. Space cross tees as indicated to receive lay-in panels and fixtures.
      - 1) Install cross runners with positive interlock.
    - b. Utilize wall angles to align and receive terminal ends of cross tees without transferring load to wall angle.
    - c. Support terminal ends of cross tees by wires located within 6 IN 150 MM from boundary walls.
  - 9. Leave suspension system ready to accept installation of acoustic materials.
- B. Lay-In Items:
- 1. Install acoustic materials in accordance with manufacturer's instructions.
  - 2. Place lay-in panels, fixtures, diffusers, grilles, and similar items in manner not compromising suspension system performance.
  - 3. Field cut materials to fit grid.
  - 4. Tegular and similar tiles with articulated edges:
    - a. Cut edges to match profile of factory edges and paint to match.
  - 5. Ceiling paint:
    - a. Touch-up minor surface scratches and blemishes.
    - b. Cover field cut edges exposed to view.
    - c. Armstrong SuperCoat Ceiling Panel Touch-up Paint.

### **3.4 CLEANING AND REPAIR**

- A. Perform cleaning of soiled units and replacement of defective or damaged units.

### **END OF SECTION**

## **SECTION 09 53 00 ACOUSTIC SUSPENSION SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for work as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. C635/C635M, Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
    - b. C636/C636M, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
    - c. [E580/E580M, Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.]

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
- B. Samples:
  - 1. Samples of each product being used minimum 6 IN long in color specified.
  - 2. Sample of intersecting grid connection system.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Acoustical suspension systems (steel):
    - a. Armstrong Ceiling and Wall Solutions.
    - b. Rockfon.
    - c. Donn by USG Corporation.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

#### **2.2 COMPONENTS**

- A. Acoustical Suspension Systems - General:
  - 1. ASTM C635/C635M, heavy duty.
  - 2. Main runner jointing by spliced, interlocking ends, tab locks, pin locks, or other suitable connections.
  - 3. Cross runners interlocking with main runners.
- B. Hangers:
  - 1. Galvanized, soft annealed steel wire for general use.
  - 2. Soft stainless steel wire for use with aluminum systems and in wet areas.

- C. Non-Rated Exposed Grid System:
  - 1. Direct hung.
  - 2. Electrogalvanized double-web steel main and cross runners.
  - 3. Finish on exposed surfaces: Smooth, flat white.
  - 4. Rockfon "SNAP-GRID 200 IN or "FIRE FRONT 1250."

## 2.3 MAINTENANCE MATERIALS

- A. Extra Material:
  - 1. Provide Owner with [8] LF of main runner and [8] LF of cross runner of each different finish and type of grid specified.
  - 2. Supply minimum 2 OZ of touch-up paint for each color of grid used.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with ASTM C636/C636M [and ASTM E580/E580M] and manufacturer's instructions.
- B. Layout suspension system centered between enclosing walls as shown on the Drawings.
  - 1. Provide equally spaced border panels wherever practicable.
  - 2. Avoid layout resulting in border panels of less than half the original size.
- C. Hang suspension systems from structural supporting and framing members, floor deck, or rough suspension system.
  - 1. Provide all hangers and inserts necessary to support acoustical ceilings.
  - 2. Provide supplementary framing where pipes, ducts, equipment or other obstructions interfere with hanger wire placement.
    - a. Provide structural members sized as required, to span ducts, etc.
    - b. Do not hang any part of the suspension system or supplementary framing from ducts, pipes, conduit, equipment, etc.
  - 3. Locate hangers to avoid contact with insulation covering ducts and pipes.
  - 4. Splay hangers only where obstructions or other conditions preclude plumb, vertical installation.
  - 5. Offset horizontal forces of splayed hangers by countersplaying, bracing or other approved methods.
- D. Space hangers to prevent loads from items in or on ceiling from causing eccentric deflection and rotation of main runners exceeding limits specified in manufacturer's technical data.
  - 1. Provide additional hangers at each corner of recessed light fixture.
  - 2. Provide hangers not more than 6 IN from ends of main runners.
  - 3. Support main runners directly from hangers.
  - 4. Space main runners to support ceiling units and other work resting in or on ceiling.
- E. Install moldings where ceilings meet walls, partitions, other vertical elements, and other types of ceilings.
  - 1. Support runners, cross-tees and border units on moldings.
    - a. Secure moldings to wall construction by fastening through holes drilled in web.
  - 2. Space holes not more than 3 IN from each end and not more than 16 IN on center.
  - 3. Draw up fasteners for tight set against vertical surfaces.
    - a. Moulding to be flush and tight to surface, without deformation.
  - 4. Miter cut inside and outside corners.
  - 5. Level to tolerances in accordance with ASTM C636/C636M.
- F. Leave suspension system ready to accept installation of acoustic materials. See Section 09 51 00.

**END OF SECTION**

**SECTION 09 65 00**  
**VINYL COMPOSITION TILE FLOORING AND RESILIENT BASE**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for work as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Americans with Disabilities Act (ADA):
    - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
  - 2. ASTM International (ASTM):
    - a. E648, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
    - b. F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
    - c. F1066, Standard Specification for Vinyl Composition Floor Tile.
    - d. F1861, Standard Specification for Resilient Wall Base.
    - e. F2034, Standard Specification for Sheet Linoleum Floor Covering.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Recommendations on adhesives, primers and leveling and patching compounds.
- B. Samples:
  - 1. Full range of colors and patterns for Engineer's color selection of each component specified.
- C. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Vinyl composition tile (VCT):
    - a. Armstrong Flooring, Inc.
    - b. Azrock by Johnsonite.
    - c. Congoleum.
    - d. Mannington Commercial.
    - e. Tarkett.
  - 2. Resilient base:
    - a. Armstrong Flooring, Inc.



- b. Burke Flooring.
    - c. FLEXCO Corporation.
    - d. Johnsonite.
    - e. Roppe Corporation.
    - f. VPI Corporation.
  - 3. Edging strips, reducers and joiners:
    - a. Burke Flooring.
    - b. FLEXCO Corporation.
    - c. Johnsonite.
    - d. Roppe Corporation.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

## **2.2 MANUFACTURED UNITS**

- A. Vinyl Composition Tile (VCT):
  - 1. 12 IN SQ x 1/8 IN.
  - 2. ASTM F1066, Comp 1, Class 2.
- B. Resilient Base (RB):
  - 1. Rubber or vinyl, ASTM F1861.
    - a. Group 1, solid through-color.
    - b. Style B, coved.
    - c. 1/8 by 4 IN.
  - 2. Factory-formed outside corners.
  - 3. Continuous rolls, minimum 95 FT long.
- C. Leveling compound as recommended by manufacturer compatible with adhesives.
- D. Adhesives and primers as recommended by manufacturer.
- E. Sheet Vinyl Accent Stripes: 1/8 x 1 IN plain color homogeneous vinyl with backing.
- F. Edging Strips, Reducers and Joiners:
  - 1. Thermoplastic vinyl.
    - a. ASTM E648, Class 1 Fire Rated.

## **2.3 MAINTENANCE MATERIALS**

- A. Extra Materials:
  - 1. Furnish Owner the following extra material:
    - a. One carton of each type and color of [slip-resistant floor tile and] vinyl composition tile.
    - b. Minimum 12 LF of resilient linoleum sheet flooring and enough welding rod to install all 12 LF of material.
    - c. Remaining portion of one partially used roll of resilient base material with a minimum of 10 LF of each height, color and type.
  - 2. Package and label extra materials to protect material during storage.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Prepare surfaces in accordance with manufacturer's recommendations and ASTM F710.
- B. Acclimate [linoleum and] tile to area in which it is to be installed for minimum 72 HRS at 68 DEGF prior to installation.
  - 1. Provide manufacturer's recommended relative humidity levels.
- C. Fill cracks, joints (except specified expansion joints), etc., in floors with a water-resistant noncrumbling patching and leveling compound.
  - 1. Trowel level.

2. Verify moisture content in concrete substrate is within acceptable limits per the floor covering manufacturer.
  - a. Conduct one test for every 1000 SQFT of flooring per room or area in accordance with manufacturer's recommendation.
  - b. Provide necessary measures to dry out the substrate in accordance with flooring manufacturer's recommendations and retest until acceptable moisture levels are obtained.
- D. Where tile flooring abuts other finish flooring materials and finished surfaces do not align, install and feather leveling compound for approximately 6 IN so that finished surfaces will align.

### 3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Floors to be free of all dust, paint, grease, oils, solvents, curing and hardening compounds, sealers and any other deleterious material which may affect the bonding of the adhesive used to install the floor coverings.
- C. Ensure recommended minimum installation temperatures are maintained before, during and after installation as required by the manufacturer.
- D. General:
  1. Apply primer and adhesive as recommended by manufacturer.
  2. Maintain minimum temperature of 68 DEGF for a minimum of 72 HRS prior to, during and after installation.
- E. Vinyl Composition Tile:
  1. Lay in pattern selected by Engineer.
  2. Bond tile to floor, flush, tight, and in true alignment with adjacent tiles and with finished surface.
  3. Fit neatly into breaks and recesses, against walls, around pipes, and other obstructions.
  4. Install edging strips where tile edge is exposed or where flooring terminates.
  5. Lay out tile to avoid less than one-half tile at permanent perimeter walls.
  6. Perform any cutting or drilling of tile as required.
  7. Install accent strips in all door openings directly under door when in closed position.
  8. Roll entire floor.
  9. Immediately after application and rolling, remove surplus adhesive.
- F. Resilient Base:
  1. Install base after wall material has thoroughly dried out.
  2. Provide base at intersections of floor and all vertical surfaces in areas scheduled to receive base, where intersection is exposed to view.
  3. Set base straight and true.
  4. Fit into breaks and recesses.
  5. Provide factory-formed outside corners; miter inside corners.
    - a. Make joints tight.
    - b. Where door frames are inset in opening, provide factory formed outside corner returned to frame; trim flush with face of frame.
  6. Install with top level and bottom edge in firm contact with floor.
- G. Edging Strips, Reducers and Joiners:
  1. Provide edging, reducers and transitions as necessary for terminating flooring or transitioning to adjacent flooring materials.
    - a. Profiles shall be ADA compliant.

### 3.3 CLEANING

- A. Clean floors in accordance with manufacturer's recommendations.
- B. Prior to final acceptance, wash, wax and buff floors.
  1. After thorough cleaning, apply two coats of wax recommended by flooring manufacturer.

2. After each coat, buff floor.

### **3.4 PROTECTION**

- A. Protect with non-staining, non-sticking building paper as may be necessary to prevent dirt and damage.
- B. Protect traffic areas with fiberboard or plywood laid over non-staining, non-sticking building paper.

**END OF SECTION**

## **SECTION 09 91 10 ARCHITECTURAL PAINTING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for work, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. D523, Standard Test Method for Specular Gloss.
    - b. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
    - c. D4259, Standard Practice for Abrading Concrete.
    - d. D4261, Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating.
    - e. D4262, Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
    - f. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
    - g. F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
    - h. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 2. National Fire Protection Association (NFPA):
    - a. 101, Life Safety Code.
  - 3. Steel Door Institute/American National Standards Institute (SDI/ANSI):
    - a. A250.10, Test Procedure and Acceptance Criteria For Prime Painted Steel Surfaces for Steel Doors and Frames.
  - 4. The Society for Protective Coatings (SSPC):
    - a. SP 1, Solvent Cleaning.
    - b. SP 2, Hand Tool Cleaning.
    - c. SP 3, Power Tool Cleaning.
    - d. SP 16, Brush-off Blast Cleaning of Non-Ferrous Metals.
  - 5. The Society for Protective Coatings/NACE International (SSPC/NACE):
    - a. SP 6/NACE No. 3, Commercial Blast Cleaning.
    - b. SP 7/NACE No. 4, Brush-off Blast Cleaning.
    - c. SP 13/NACE No. 6, Surface Preparation of Concrete.
  - 6. United States Environmental Protection Agency (EPA).
- B. Miscellaneous:
  - 1. Coating used in all corridors and stairways shall meet requirements of NFPA 101 and ASTM E84.

#### **1.3 DEFINITIONS**

- A. Installer or Applicator:
  - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  - 2. Installer and applicator are synonymous.
- B. Approved Factory Finish: Finish on a product in compliance with the finish specified in the Specification Section where the product is specified.
- C. Exposed Exterior Surface:

1. Exterior surface which is exposed to view.
  2. Exterior surface which is exposed to weather but not necessarily exposed to view.
- D. Finished Area:
1. An area that is listed in or has finish called for on Room Finish Schedule.
  2. An area that is indicated on Drawings to be painted.
- E. Gloss Range:
1. Specular gloss measured in accordance with ASTM D523:
    - a. Flat: Below 15, at 60 DEG.
    - b. Eggshell: Between 20 and 35, at 60 DEG.
    - c. Semi-gloss: Between 35 and 70, at 60 DEG.
    - d. Gloss: More than 70, at 60-degrees.
- F. Paint includes the following:
1. Architectural paints (AP) include: Acrylic latex or alkyd enamel coatings.
  2. Special coatings (SC) include: Water-based pigmented resin particles suspended in acrylic latex solution.
  3. Stains and varnish include: Alkyd stain and polyurethane varnish.

#### 1.4 SUBMITTALS

- A. Shop Drawings:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's surface preparation instructions.
    - c. Manufacturer's application instructions.
- B. Samples:
1. Manufacturer's full line of colors for Engineer's preliminary color selection.
  2. Gloss samples.
  3. After preliminary color selection by Engineer provide two (2) 8 by 10 IN samples of each final color and sheen selected.
- C. Informational Submittals:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  2. Test results.
  3. Applicator's daily records:
    - a. Submit daily records at end of each week in which painting work is performed unless requested otherwise by Engineer's on-site representative.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in original containers, labeled as follows:
1. Name or type number of material.
  2. Manufacturer's name and item stock number.
  3. Contents, by volume, of major constituents.
  4. Warning labels.
  5. VOC content.
- B. Store materials in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 DEGF.

#### 1.6 PROJECT CONDITIONS

- A. Verify that atmosphere in area where painting is to take place is within paint manufacturer's acceptable temperature, humidity and sun exposure limits.
1. Provide temporary heating, shade and/or dehumidification as required to bring area within acceptable limits.

- a. Provide temporary dehumidification equipment properly sized to maintain humidity levels required by paint manufacturer.
- b. Provide clean heat with heat exchanger type equipment sufficient in size to maintain temperature on a 24 HR basis.
  - 1) Vent exhaust gases to exterior environment.
  - 2) No exhaust gases shall be allowed to vent into the space being painted or any adjacent space.
2. Do not apply coatings in snow, rain, fog or mist.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Provide products from a single manufacturer to the greatest extent practicable.
- B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  1. Architectural paints:
    - a. Benjamin Moore & Co.
    - b. PPG IdeaScapes.
    - c. Pratt & Lambert.
    - d. Sherwin-Williams.
    - e. Tnemec, Inc.
  2. Special coatings:
    - a. Master Coating Technologies, Inc. - Zolatone.
    - b. Dryvit Systems, Inc.
  3. Stains and varnish:
    - a. Benjamin Moore & Co.
    - b. PPG IdeaScapes.
    - c. Pratt & Lambert.
    - d. Sherwin-Williams.
- C. No like, equivalent or "or-equal" item [or substitution] is permitted.
- D. Submit request for substitution in accordance with Specification Section 01 25 13.

### 2.2 MATERIALS

- A. General:
  1. For unspecified materials such as thinner, provide manufacturer's recommended products.
  2. Unless noted otherwise, products listed are manufactured by the manufacturer listed below.
    - a. Products of other manufacturers will be considered for use provided that the product:
      - 1) Is of the same generic formulation.
      - 2) Has comparable application requirements.
      - 3) Meets the same VOC levels or better.
      - 4) Provides the same finish and color options.
  3. Coatings shall comply with the VOC limits of EPA[, LEED][ and:]
  4. Colors:
    - a. Colors and gloss will be selected from the manufacturer's complete offering, including special colors and premium offerings.
- B. Architectural Paints:
  1. Product List:

Generic Description	Product
Acrylic Primer	PPG Pure Performance 9-900
Acrylic Latex	PPG Pure Performance 9-100/9-300/9-500 Series

Generic Description	Product
Acrylic Gloss	PPG Speedhide 6-8534 Series
Concrete Filler/Surfacer	Tnemec Series 215 and/or Series 218
CMU Block Filler	Tnemec Series 54 Masonry Filler
Dry-Fall Primer	Tnemec Series V115 Uni-Bond DF
Epoxy Barrier Coat	Tnemec Series 135 Chembuild
Fluoropolymer	Tnemec Series 1070V/1071V/1072V Fluoronar
HDP Acrylic	Tnemec Series 1028/1029 Enduratone
Organic Zinc Primer	Tnemec Series 94-H2O Hydro-Zinc
Polycarbamide	Tnemec Series 740/750 UVX
Waterborne Acrylate	Tnemec Series 156 Enviro-Crete

## C. Special Coatings:

## 1. Product List:

Generic Description	Product
Special Coating Acrylic Primer	Zolatone SP203 Acrylic Basecoat.
Special Coating Stain Blocker	Zolatone SP222 Eco-Block.
Special Coating Base Coat	Zolatone Flex Base Coat.
Special Coating Finish Coat	Zolatone Flex Finish Coat.

## D. Stains and Varnishes:

## 1. Product List:

Generic Description	Product
Sanding sealer	PPG Olympic 41061 Premium Interior Water Based Sanding Sealer
Alkyd Wood Stain	PPG Olympic 44500 Premium Interior Oil Based Wood Stain
Polyurethane Varnish	PPG Olympic 42786 Premium Interior Water Based Polyurethane Clear Satin

**2.3 PAINT SYSTEMS:**

## A. Schedule:

Substrate	Prime Coat <sup>1</sup>	Intermediate Coat(s) <sup>1</sup>	Finish Coat <sup>1</sup>
Concrete	Concrete Filler/Surfacer as necessary to fill all voids and depressions	100 to 200 SQFT/GAL Waterborne Acrylate	100 to 200 SQFT/GAL Waterborne Acrylate
Concrete Masonry	80 to 100 SQFT/GAL CMU Block Filler	100 to 200 SQFT/GAL Waterborne Acrylate	100 to 200 SQFT/GAL Waterborne Acrylate

Structural Steel and Miscellaneous Metals <sup>3</sup>	2.5 to 3.5 MIL Organic Zinc Primer	2.0 to 3.0 MIL HDP Acrylic <sup>2</sup>	2.0 to 3.0 MIL HDP Acrylic <sup>2</sup>
Galvanized Structural Steel and Miscellaneous Metals <sup>3</sup>	2.0 to 4.0 MIL Dry-Fall Acrylic	XX	2.0 to 3.0 MIL HDP Acrylic <sup>2</sup>
Galvanized Metal Deck <sup>3</sup>	2.0 to 4.0 MIL Dry-Fall Acrylic	XX	2.0 to 4.0 MIL Dry-Fall Acrylic
Factory Primed Metal Deck <sup>3</sup>	XX	2.0 to 4.0 MIL Dry-Fall Acrylic	2.0 to 4.0 MIL Dry-Fall Acrylic
Hollow Metal - Interior	4.0 to 5.0 MIL DFT Epoxy Barrier Coat	2.0 to 3.0 MIL HDP Acrylic <sup>2</sup>	2.0 to 3.0 MIL HDP Acrylic <sup>2</sup>
Hollow Metal - Exterior	4.0 to 5.0 MIL DFT Epoxy Barrier Coat	2.5 to 3.5 MIL Polycarbamide <sup>2</sup>	2.5 to 3.5 MIL Polycarbamide <sup>2</sup>
Sectional Overhead Doors	4.0 to 5.0 MIL DFT Epoxy Barrier Coat	XX	2.0 to 3.0 MIL DFT Fluoropolymer <sup>2</sup>
Gypsum Board scheduled to receive "AP"	300 to 400 SQFT/GAL Acrylic Primer	300 to 400 SQFT/GAL Acrylic Latex <sup>2</sup>	300 to 400 SQFT/GAL Acrylic Latex <sup>2</sup>
Gypsum Board scheduled to receive "SC"	250 to 350 SQFT/GAL Special Coating Acrylic Primer	250 to 300 SQFT/GAL Special Coating Base Coat	125 to 150 SQFTGAL Special Coating Finish Coat

1. Application rates (SF/GAL) shown are for unthinned materials.

2. Sheen as scheduled or selected.

3. For steel elements to receive fireproofing, see Specification Section 07 81 00.

## PART 3 - EXECUTION

### 3.1 ITEMS TO BE PAINTED

- A. Exterior surfaces, including but not limited to:
  - 1. Concrete:
    - a. Where indicated on Drawings.
  - 2. Concrete masonry:
    - a. Where indicated on Drawings.
  - 3. Structural steel:
    - a. Columns, beams and bracing.
    - b. Field welded connections of factory painted structural steel.
  - 4. Steel railings.
  - 5. Galvanized steel railings.
  - 6. Miscellaneous ferrous metal surfaces:
    - a. Items specifically noted on Drawings to be painted.
  - 7. Miscellaneous galvanized steel surfaces:
    - a. Pipe Bollards.
    - b. Embed Plates.
    - c. Loose lintels.
    - d. Steel components of concrete lintels.



- e. Items specifically noted on Drawings to be painted.
- 8. Doors and frames:
  - a. Hollow metal doors and frames.
  - b. Hollow metal window frames.
- B. Interior Areas:
  - 1. Refer to Room Finish Schedule on Drawings.
    - a. If space is scheduled to be painted, paint all appurtenant surfaces within the space unless specifically noted otherwise.
    - b. Provide coating manufacturer's recommended bonding primer.
    - c. Appurtenant surfaces include but are not limited to:
      - 1) Columns, beams, bracing and similar components.
      - 2) Underside of roof or floor decks above.
      - 3) Conduit, boxes, covers and supports.
      - 4) Ductwork, duct insulation and duct supports.
      - 5) Piping, pipe insulation and jacketing.
      - 6) Miscellaneous ferrous metal surfaces.
  - 2. Concrete walls and columns.
  - 3. Concrete masonry.
  - 4. Doors and frames:
    - a. Hollow metal doors and frames
    - b. Hollow metal window frames.
    - c. Four-fold industrial doors.
    - d. Sectional overhead doors.

### 3.2 ITEMS NOT TO BE PAINTED

- A. General: Do not paint items listed in this Article, unless noted otherwise.
- B. Items with Approved Factory Finish: These items may require repair of damaged painted areas or painting of welded connections.
- C. Electrical equipment.
- D. Moving parts of mechanical and electrical units where painting would interfere with the operation of the unit.
- E. Code labels, equipment identification or rating plates and similar labels, tagging and identification.
- F. Contact surfaces of friction-type structural connections.
- G. Stainless steel surfaces.
- H. Aluminum Surfaces Except:
  - 1. Where specifically shown in the Contract Documents.
  - 2. Where in contact with concrete.
  - 3. Where in contact with dissimilar metals.
  - 4. Appurtenant surfaces as described in the ITEMS TO BE PAINTED article.
- I. Fiberglass Surfaces Except:
  - 1. Fiberglass piping where specifically noted to be painted.
  - 2. Piping supports where specifically noted to be painted.
  - 3. Appurtenant surfaces as described in the ITEMS TO BE PAINTED article.
- J. Galvanized steel items, unless specifically noted to be painted.
- K. Structural steel or steel deck required to be fireproofed in accordance with Specification Section 07 81 00.
  - 1. Provide intumescent paint where indicated.
- L. Architectural finishes:
  - 1. Exterior concrete indicated to receive another finish.

2. Precast concrete surfaces, unless specifically indicated to be painted.
3. Prefinished masonry surfaces:
  - a. Precolored masonry (exterior face).
    - 1) Interior face shall be painted where scheduled.
  - b. Burnished (ground face) concrete masonry.
  - c. Prefaced masonry.
  - d. Face brick.
  - e. Glass masonry.
4. Plastic laminate.
5. Solid surface material.
6. Standing and running trim.
7. Fiberglass fabrications.
8. Anodized aluminum.
9. PVDF coated metals.
10. Factory finished doors and frames.
11. Aluminum windows, curtainwall and storefront framing systems.
12. Finish hardware.
13. Glass and glazing.
14. Ceramic, porcelain, quarry tile or natural stone.
15. Acoustical materials.
16. Building specialties.
17. Louvers.
18. Casework and countertops.
19. Pipe insulation and jacketing.
20. Standing seam metal roof, fascia, trim, soffit and accessories.

### 3.3 EXAMINATION

#### A. Concrete:

1. Test pH of surface to be painted in accordance with ASTM D4262.
  - a. If surface pH is not within paint manufacturer's required acceptable range, use methods acceptable to paint manufacturer as required to bring pH within acceptable range.
  - b. Retest pH until acceptable results are obtained.
2. Verify that moisture content of surface to be painted is within paint manufacturer's recommended acceptable limits.
  - a. Test surface to be coated in accordance with ASTM D4263 to determine the presence of moisture.
    - 1) If moisture is detected, test moisture content of surface to be coated in accordance with ASTM F1869.
    - 2) Provide remedial measures as necessary to bring moisture content within paint manufacturer's recommended acceptable limits.
    - 3) Retest surface until acceptable results are obtained.

#### B. Concrete Unit Masonry:

1. Test pH of surface to be painted in accordance with ASTM D4262.
  - a. If surface pH is not within paint manufacturer's required acceptable range, use methods acceptable to paint manufacturer as required to bring pH within acceptable limits.
  - b. Retest pH until acceptable results are obtained.
2. Verify that moisture content of surface to be painted is within paint manufacturer's recommended acceptable limits.
  - a. Test surface to be coated in accordance with ASTM D4263 to determine the presence of moisture.
    - 1) If moisture is detected, test moisture content of surface to be coated in accordance with ASTM F1869.
    - 2) Provide remedial measures as necessary to bring moisture content within paint manufacturer's recommended acceptable limits.
    - 3) Retest surface until acceptable results are obtained.

### 3.4 PREPARATION

- A. General:
  - 1. Prepare surfaces to be painted in accordance with paint manufacturer's instructions and this Specification Section unless noted otherwise in this Specification Section.
    - a. Where discrepancy between paint manufacturer's instructions and this Specification Section exists, the more stringent preparation shall be provided unless approved otherwise, in writing, by the Engineer.
  - 2. Remove all dust, grease, oil, compounds, dirt and other foreign matter which would prevent bonding of paint to surface.
  - 3. Adhere to manufacturer's recoat time surface preparation requirements.
    - a. Surfaces that have exceeded paint manufacturer's published recoat time and/or have exhibited surface chalking shall be prepared prior to additional paint in accordance with manufacturer's published recommendations.
- B. Protection:
  - 1. Protect surrounding surfaces not to be coated.
  - 2. Remove and protect hardware, accessories, plates, fixtures, finished work, and similar items; or provide ample in-place protection.
  - 3. Protect code labels, equipment identification or rating plates and similar labels, tagging and identification.
- C. Prepare and paint before assembly all surfaces which are inaccessible after assembly.
- D. Existing Surfaces:
  - 1. Wherever existing work is cut, patched or modified; repair and repaint to match new work.
  - 2. Where a wall or ceiling is disturbed and patched, paint entire wall or ceiling.
- E. Wood:
  - 1. Sandpaper smooth, remove dust.
  - 2. Opaque Finishes:
    - a. Seal all knots, pitch and resinous sapwood after prime coat has dried.
    - b. Putty holes and imperfections; sand smooth.
  - 3. Transparent Finishes:
    - a. Treat wood with compatible wash-coat prior to stain application.
    - b. Putty holes and imperfections to match wood color; sand smooth.
- F. Ferrous Metal:
  - 1. Complete fabrication, welding or burning before beginning surface preparation.
    - a. Chip or grind off flux, spatter, slag or other laminations left from welding.
    - b. Remove mill scale.
    - c. Grind smooth rough welds and other sharp projections.
  - 2. Solvent clean in accordance with SSPC SP 1 to remove all dust, grease, oil, compounds, dirt and other foreign matter.
  - 3. Exterior exposure:
    - a. Commercial blast clean in accordance with SSPC SP 6/NACE No. 3.
  - 4. Interior exposure:
    - a. Hand tool cleaning in accordance with SSPC SP 2 and/or power tool cleaning in accordance with SSPC SP 3.
- G. Hollow Metal:
  - 1. Solvent clean in accordance with SSPC SP 1 to remove all dust, grease, oil, compounds, dirt and other foreign matter.
  - 2. Lightly sand primed surfaces with fine grit sandpaper as recommended by hollow metal manufacturer.
- H. Galvanized Steel and Non-ferrous Metals:
  - 1. Solvent clean to remove all dust, grease, oil, compounds, dirt and other foreign matter.
  - 2. Brush-off blast in accordance with SSPC SP 16 or hand tool cleaning in accordance with SSPC SP 2 to remove surface contaminants.

- I. Gypsum Wallboard:
  - 1. Repair minor irregularities left by finishers.
  - 2. Avoid raising nap of paper face on gypsum wallboard.
  - 3. Verify moisture content is less than 8 PCT before painting.
  - 4. After application of prime coat and between subsequent coats, inspect surface and repair holes, dents, irregularities or other defects as necessary to provide a smooth, uniform finish.
- J. Concrete:
  - 1. Cure for minimum of 28 days.
  - 2. Clean in accordance with ASTM D4258.
    - a. Remove all soil, grease, oil, or other surface contaminants.
  - 3. Grind fins and protrusions in accordance with ASTM D4259, flush to plane of wall.
  - 4. Abrasive blast in accordance with ASTM D4259 and SSPC SP13/NACE No. 6.
    - a. Remove all laitance, efflorescence, scabbing and other foreign matter.
    - b. Provide minimum concrete surface profile CSP 3 per ICRI 310.2.
  - 5. Test pH and moisture content in accordance with EXAMINATION article in this specification section.
  - 6. Repair tie holes, voids, bugholes or other surface defects as necessary to provide smooth, uniform surface.
- K. Concrete Unit Masonry:
  - 1. Cure for minimum of 28 days.
  - 2. Remove all mortar spatters and protrusions.
  - 3. Clean in accordance with ASTM D4261.
    - a. Remove all soil, grease, oil, efflorescence.
  - 4. Test pH and moisture content in accordance with EXAMINATION article in this specification section.

### 3.5 APPLICATION

- A. General:
  - 1. Thin, mix and apply paints in accordance with manufacturer's installation instructions.
    - a. Where discrepancy exists between manufacturer's instructions and this Specification Section, the more stringent requirement shall apply.
    - b. When materials have been thinned, adjust application rates as necessary to achieve film coverage indicated in Part 2 for unthinned materials.
    - c. Backroll spray applied paints.
  - 2. Temperature and weather conditions:
    - a. Do not paint surfaces when surface temperature is below 50 DEGF unless product has been formulated specifically for low temperature application and application is approved in writing by Engineer and paint manufacturer's authorized representative.
    - b. Avoid painting surfaces exposed to hot sun.
    - c. Do not paint on damp surfaces.
  - 3. Apply materials under adequate illumination.
  - 4. Evenly spread to provide full, smooth coverage.
    - a. All paint systems are "to cover."
      - 1) When color or undercoats show through, apply additional coats until paint film is of uniform finish and color.
    - b. Finished paint system shall be uniform and without voids, bugholes, holidays, laps, brush marks, roller marks, runs, sags or other imperfections.
  - 5. If so directed by Engineer, do not apply consecutive coats until Engineer has had an opportunity to observe and approve previous coats.
  - 6. Work each application of material into corners, crevices, joints, and other difficult to work areas.
  - 7. When painting rough surfaces, hand brush and backroll paint to work into all recesses.
  - 8. Smooth out runs or sags immediately, or remove and recoat entire surface.
  - 9. Allow preceding coats to dry before recoating.
    - a. Recoat within time limits specified by paint manufacturer.

- b. If recoat time limits have expired re-prepare surface in accordance with paint manufacturer's printed recommendations.
  - 10. Allow coated surfaces to cure prior to allowing traffic or other work to proceed.
  - 11. Finish colors not otherwise indicated shall be selected by Engineer from paint manufacturer's complete offering.
- B. Fillers, surfacers or patching compounds:
  - 1. Provide fillers, surfacers or patching compounds in accordance with manufacturer's recommendations and as specified herein as necessary to provide a smooth, defect free substrate.
- C. Prime Coat Application:
  - 1. Prime all surfaces indicated to be painted.
    - a. Apply prime coat in accordance with paint manufacturer's written instructions and as written in this Specification Section.
  - 2. Ensure field-applied paints are compatible with factory-applied paints or existing coatings.
    - a. Employ services of coating manufacturer's qualified technical representative.
      - 1) Certify through material data sheets.
      - 2) Perform test patch.
    - b. If field-applied coating is found to be not compatible, require the coating manufacturer's technical representative to recommend, in writing, product to be used as barrier coat, thickness to be applied, surface preparation and method of application.
    - c. At Contractor's option, coatings may be removed, surface re-prepared, and new coating applied using appropriate paint system listed in the MATERIALS Article, Paint Systems paragraph of this Specification Section.
      - 1) All damage to surface as result of coating removal shall be repaired to original condition or better by Contractor at no additional cost to Owner.
  - 3. Special coatings prime coat application:
    - a. Prime new gypsum board surfaces using sealer as recommended by manufacturer.
      - 1) Apply at rate per manufacturer's recommendation.
    - b. Prime and fill new concrete and masonry using sealer coat as recommended by manufacturer followed by modified epoxy filler as specified.
    - c. Prime filled concrete and masonry surfaces with primer at rates and as recommended by manufacturer.
  - 4. Back prime all wood scheduled to be painted, prior to installation.
  - 5. Touch up damaged primer coats prior to applying finish coats.
    - a. Restore primed surface equal to surface before damage.
- D. Finish Coat Application:
  - 1. Apply finish coats in accordance with paint manufacturer's written instructions and in accordance with this Specification Section.
  - 2. Touch up damaged finish coats using same application method and same material specified for finish coat.
    - a. Prepare damaged area in accordance with the PREPARATION Article of this Specification Section.
  - 3. Hollow metal frames and doors:
    - a. Finish coats shall be spray applied only.
    - b. Finish edges same as faces of doors.
  - 4. Varnish:
    - a. Apply first coat of varnish: Gloss.
      - 1) Allow to dry a minimum of 48 HRS.
    - b. Apply second and third coats of varnish: Satin.
      - 1) Allow a minimum of 48 HRS between each coat.
    - c. Lightly sand between coats as required and remove dust.

### 3.6 FIELD QUALITY CONTROL

- A. Application Deficiencies:

1. Surfaces showing runs, laps, brush marks, telegraphing of surface imperfections or other defects will not be accepted.
  2. Surfaces showing evidence of fading, chalking, blistering, delamination or other defects due to improper surface preparation, environmental controls or application will not be accepted.
- B. Provide protection for painted surfaces.
1. Surfaces showing soiling, staining, streaking, chipping, scratches, or other defects will not be accepted.
- C. Maintain Daily Records:
1. Record the following information during application of each coat of paint applied:
    - a. Date, starting time, end time, and all breaks taken by painters.
    - b. For exterior painting:
      - 1) Sky condition.
      - 2) Wind speed and direction.
    - c. Air temperature.
    - d. Relative humidity.
    - e. Moisture content and surface temperature of substrate prior to each coat.
    - f. Provisions utilized to maintain work area within manufacturer's recommended application parameters including temporary heating, ventilation, cooling, dehumidification and provisions utilized to mitigate wind blown dust and debris from contaminating the wet paint film.
    - g. Record environmental conditions, substrate moisture content and surface temperature information not less than once every four (4) hours during application.
      - 1) Record hourly when temperatures are below 50 DEGF or above 100 DEGF.
  2. Record the following information daily for the paint manufacturer's recommended curing period:
    - a. Date and start time of cure period for each item or area.
    - b. For exterior painting:
      - 1) Sky conditions.
      - 2) Wind speed and direction.
    - c. Record environmental conditions not less than once every 12 HRS.
      - 1) Record once every 4 HRS when ambient temperature is below 35 DEGF.
    - d. Provisions utilized to protect each item or area and to maintain areas within manufacturer's recommended curing parameters.
  3. Format for daily record to be computer generated.
- D. Measure surface temperature of items to be painted with surface temperature gage specifically designed for such.
- E. Measure substrate humidity with humidity gage specifically designed for such.
- F. Provide wet paint signs.

### 3.7 CLEANING

- A. Clean paint spattered surfaces.
  1. Use care not to damage finished surfaces.
- B. Remove masking, adhesive residue or other foreign materials.
- C. Upon completion of painting, replace hardware, accessories, plates, fixtures, and similar items.
- D. Remove surplus materials, scaffolding, and debris.

### 3.8 COLOR SCHEDULE

- A. As indicated on drawings. Contractor shall obtain color samples of existing building components and match the color of the new work with the color of the existing components.
- B.

**END OF SECTION**

## **SECTION 10 14 23 SIGNS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services required for fabrication and installation of Signs as indicated in the drawings.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. 2010 ADA Standards for Accessible Design.
- B. American National Standards Institute, ICC/ANSI A117.1.

#### **1.3 SUBMITTALS**

- A. Samples:
  - 1. Color and font samples for approval.

#### **1.4 WARRANTY**

- A. Manufacturer shall warrant workmanship and materials for a period of two (2) years.

### **PART 2 - PRODUCTS**

#### **2.1 ACCEPTABLE MANUFACTURERS**

- 1. Signs:
  - a. Base:
    - 1) Poblocki Sign Company.
  - b. Optional:
    - 1) Mohawk Sign Systems.
    - 2) ASI Sign Systems.
    - 3) Best Manufacturing Sign Systems.
    - 4) Innerface Architectural Signage.
    - 5) InPro Corporation.
- 2. Other manufacturers desiring approval comply with Section 00 26 00.

#### **2.2 MATERIALS**

- A. Signs:
  - 1. Three-ply plastic laminate, 1-1/2 IN 38 MM wide x length required for script.
  - 2. Nominal letter height: 3/4 IN 19 MM.
  - 3. Letters and numbers: Raised 1/32 IN 0.8 MM.
  - 4. Uppercase.
  - 5. Letter style: Sans serif.
  - 6. Color: As selected.
    - a. Characters: Dark.
    - b. Background: Light.
  - 7. Finish: Nonglare.
  - 8. Bevel edges.
  - 9. Letters shall conform to following proportional standard:
    - a. The font width of uppercase letter "O" shall be 55 PCT minimum and 110 PCT maximum height of uppercase letter "I".
    - b. Stroke thickness of uppercase letter "I" shall be 10 PCT minimum and 30 PCT maximum height of character.



10. Tactile lettering shall conform to following standards:
  - a. Character height measured vertically from the baseline of character shall be 5/8 IN minimum and 2 IN 50 MM maximum based on height of uppercase letter "I".
  - b. Stroke thickness of uppercase letter "I" shall be 15 PCT maximum height of character.
  - c. The font width of uppercase letter "O" shall be 55 PCT minimum and 110 PCT maximum height of uppercase letter "I".
  - d. Maintain minimum 1/8 IN 3 MM font separation between characters.
11. Braille characters shall conform to the following standard:
  - a. Braille characters shall be separated from adjacent raised characters or symbols 1/2 IN.
  - b. Grade 2 Braille translation to be provided by identification device manufacturer.
- B. Directional and identification signs for communications systems: International symbols.
- C. Adhesive: 3M double-coated urethane foam tape.
  1. 4032 for smooth surfaces.
  2. 4016 for rough surfaces.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Location:
  1. Single doors: Install on wall adjacent to latch side of door.
  2. Double doors: Install on nearest adjacent wall.
- B. Mount 5 FT above finish floor to centerline of sign.
- C. Mount using adhesive tape.

### **3.2 SCHEDULE**

- A. Provide signs that match the name of the room shown on the floor plans. Install signs on door or adjacent to the door entering the room.

**END OF SECTION**

## **SECTION 10 44 00 FIRE PROTECTION SPECIALTIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Fire Protection Specialties in accord with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

#### **1.2 QUALITY ASSURANCE**

- A. Provide fire extinguishers, cabinets and accessories by single manufacturer.
- B. National Fire Protection Association (NFPA):
  - 1. NFPA 10 Standard for Portable Fire Extinguishers.
- C. Americans with Disabilities Act (ADA):
  - 1. Standards for Accessible Design.

#### **1.3 SUBMITTALS**

- A. Contract Closeout Information:
  - 1. Maintenance data.
    - a. See Section 01 78 23.

### **PART 2 - PRODUCTS**

#### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Fire Protection Specialties:
  - 1. Base:
    - a. JL Industries.
  - 2. Optional:
    - a. Badger.
    - b. Larsen's Manufacturing.
    - c. Nystrom.
- B. Fire Extinguishers:
  - 1. Base:
    - a. JL Industries.
  - 2. Optional:
    - a. Amerex.
    - b. Badger.
    - c. Larsen's Manufacturing.
    - d. Nystrom.

#### **2.2 MATERIALS**

- A. Fire Extinguishers:
  - 1. Multi-Purpose Chemical Fire Extinguishers:
    - a. Typical FE, except where more specialized types are required.
    - b. Fluidized and siliconized chemical powder extinguishing agent suitable for class A, B and C fires.
    - c. Construction:
      - 1) Heavy-duty steel cylinder with metal valve and siphon tube with replaceable molded valve stem seal, visual pressure gauge, pull pin and upright squeeze grip.
      - 2) Corrosion and impact-resistant, powdercoat finish.

- 3) Color: Red, in accord with OSHA requirements.
- d. Capacity: 10 LBS.
  - 1) UL-rating: 4A-80BC.
  - 2) Base Product Model: Cosmic 10E by JL Industries.
- e. Provide one FE for each:
  - 1) Fire Extinguisher (FE) location.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Verify suitability of substrates to accept installation.
- B. Installation constitutes acceptance of responsibility for performance.

### **3.2 INSTALLATION**

- A. Install extinguishers and cabinets within limitations of NFPA-10 and ADA.
- B. Fasten mounting brackets and cabinets to structure, square and plumb, to comply with manufacturer's instructions.
- C. Provide unistrut or welded steel support where needed to mount cabinets or brackets in mechanical rooms and similar locations.
- D. Provide required closures.
- E. Mounting Height:
  - 1. Fire Extinguisher Cabinets (FEC):
    - a. Locate with centerline of cabinet door handle not more than 48 IN AFF.
  - 2. Fire Extinguishers (FE) not contained in a cabinet:
    - a. Locate wall brackets such that extinguisher release mechanism will not be higher 48 IN AFF.

### **3.3 ADJUSTING AND CLEANING**

- A. Remove temporary protective coverings and strippable films.
- B. Adjust fire protection cabinet doors to operate easily without binding.
  - 1. Verify that integral locking devices operate properly.
- C. Clean interior and exterior surfaces.

## **END OF SECTION**

## **SECTION 21 05 00 FIRE PROTECTION SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Sprinkler systems, wet-pipe. Sprinkler will be protecting a Maintenance Storage (S-1) Garage used for the storing of equipment and materials used to maintain the airport. The Maintenance Garage will also contain a new small office.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 01 - General Requirements.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 2. National Fire Protection Association (NFPA):
    - a. 13, Standard for the Installation of Sprinkler Systems.
    - b. 20, Standard for the Installation of Stationary Pumps for Fire Protection.
    - c. 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
    - d. 70, National Electrical Code (NEC).
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. 508, Standard for Industrial Control Equipment.
- B. Qualifications:
  - 1. Use subcontractors with prior, demonstrable experience with fire protection systems.
  - 2. Fire protection system to be designed by a Professional Engineer, registered in the State of Florida.
    - a. Drawings to include certification, signature and registration number of the Professional Engineer.
  - 3. Installers: Use workmen skilled in this trade.
- C. Design, furnish and install complete fire protection systems as indicated and as required by local authorities.
  - 1. Where there is conflict between local authority requirements or other standards agency requirements and these Drawings and Specifications, requirements of standards agencies of local authorities shall govern.
  - 2. Design and install entire system in accordance with indicated codes, standards and regulations.

#### **1.3 SYSTEM DESCRIPTION**

- A. Design Requirements:
  - 1. Design fire sprinkler systems.
  - 2. Design fire sprinkler and suppression systems.
    - a. Obtain water supply fire flow test prior to designing systems.
      - 1) Flow hydrant location: #10655.
      - 2) Gage hydrant location: #8441.
    - b. Compare flow test results to those listed below and use lowest pressure of the two (2) to design systems.
      - 1) Static pressure: 78 PSIG.
      - 2) Residual pressure: 58 PSIG.
      - 3) Flow: 975 GPM.
      - 4) Pitot pressure: 33.5 PSIG.

- 5) Nozzle size: DN 2.5 IN.
  - 6) Butt coefficient: 0.9.
  - c. Design systems using adjusted water supply curve:
    - 1) Adjust the flow test water supply curve to correspond with the low hydraulic grade line as provided by the water supplier.
  - d. Designs shall include a minimum safety allowance of 10 PSIG below the adjusted water supply curve.
- B. Completely coordinate work of this Specification Section with all other work in order to provide a complete and workable system acceptable to fire authorities and in accordance with the Contract Documents.

#### 1.4 SUBMITTALS

- A. Shop Drawings:
- 1. See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Submit complete layout drawings of sprinkler systems, fire pump system, alarm and signal devices.
  - 3. Submit wiring diagrams of control, alarm and signal devices.
  - 4. Indicate hazard classification of all sprinkled spaces on Shop Drawings.
  - 5. Submit complete hydraulic and/or pipe schedule (as applicable), sizing and design calculations for all portions of the sprinkler system.
  - 6. Submit catalog data and specifications for all manufactured components supplied as part of the fire protection system.
  - 7. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70. Include any required calculations per Section 01 61 03.
- B. Certifications:
- 1. Certification that all plans and calculations, including sprinkler flow calculations have been approved by all agencies with jurisdiction.
  - 2. Certification that all required post installation tests and inspections have been completed and approved by all agencies with jurisdiction.
- C. Contract Closeout Information:
- 1. Operation and Maintenance Data:
    - a. See Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- D. Recommended Spare Parts:
- 1. Spare parts inventory with individual cost.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
- 1. Fire department valves:
    - a. Elkhart.
    - b. Potter-Roemer.
    - c. Seco.
    - d. Grinnell.
    - e. Croker-Standard.
  - 2. Fire department (Siamese) connections:
    - a. Elkhart.
    - b. Potter-Roemer.
    - c. Seco.
    - d. Croker-Standard.

3. Alarm and signal devices:
    - a. Notifier
    - b. Autocall.
    - c. Automatic Fire-Trol.
    - d. Gem.
    - e. Viking.
  4. Sprinkler heads:
    - a. Grinnell.
    - b. Viking.
  5. Pipe hangers:
    - a. Star Sprinkler Corp.
- B. Submit request for any substitution by written RFI and submit alternate product submittal in accordance with Section 01 33 00.

## 2.2 MATERIALS

- A. Use only new, unused material, designed and guaranteed to perform service required and approved by NFPA.
- B. Pipe and Fittings:
1. Optional pipe materials and joining methods approved by NFPA 13 and NFPA 14 are allowed if in accordance with applicable agency approval requirements.

## 2.3 MANUFACTURED UNITS

- A. Pipe Hangers:
1. All purpose type, UL listed and FM approved.
    - a. Star Sprinkler Corp., "Stargard 100 IN.
  2. Space in accord with requirements of NFPA.
  3. Hangers, hanger rods, inserts and clamps constructed as approved by NFPA.
- B. Valves and Hose Connections:
1. General:
    - a. UL and FM approved.
    - b. Minimum: 175 PSI class.
    - c. Outlet/inlet threads to fit local fire department standards.
  2. Fire department valves (FDV): 2-1/2 IN fire department valve with 300 LB cast brass body, cap and chain; rough brass finish.
  3. Alarm check valve:
    - a. 175 LB UL listed, FM approved iron body, cast bronze clapper, neoprene O-ring seal, tapped bosses for and with water pressure gages, alarm test valve, main drain valve, alarm retarding chamber.
    - b. Include angle valves, globe valves, alarm line strainer, orifice restriction, pipe nipples and fittings.
- C. Sprinkler Heads:
1. General:
    - a. Provide heads of type required for service indicated.
    - b. Standard 165 DEGF rating except when application requires higher rating.
    - c. In no case use heads rated less than 50 DEGF higher than anticipated ambient temperature.
    - d. All sprinklers UL listed.
    - e. Head application:
      - 1) Rooms without ceilings: Type 1.
      - 2) Finished rooms: Type 2 except as indicated.
      - 3) Sprinkler head Type 1:
        - a) Upright or pendent design as required.
        - b) Standard bronze finish.
      - 4) Sprinkler head Type 2:

- a) Pendant design.
  - b) Satin chrome finish with escutcheon plate.
- D. Alarm and Signal Devices:
- 1. Water-flow detector:
    - a. Vane type flow switch with retard mechanism or manual adjustment to prevent false alarm.
    - b. 175 PSI rated.
    - c. 115 VAC/30 VDC rated for pilot duty only.
    - d. Suitable for working pressure of 150 PSI with sensitivity adjusting screw.
    - e. Provide with contacts for remote signal wiring.
  - 2. Valve tamper switch:
    - a. 115 VAC/30 VDC.
    - b. Switches for butterfly valves to be UL approved.
  - 3. Pressure gages:
    - a. 3-1/2 IN dial, phosphor bronze tube, brass socket, 300 PSI range.
    - b. Ametek P1590.

## 2.4 PERFORMANCE AND DESIGN REQUIREMENTS

- A. Sprinkler Systems:
- 1. Provide sprinkler system types as designated on the Drawings.
  - 2. Design basis is to be hydraulically designed sprinkler system in accordance with applicable NFPA Codes and Standards.
  - 3. Wet pipe systems:
    - a. Apparatus Bay:
      - 1) Coverage: Minimum discharge density of 0.2 GPM/SQFT over the hydraulically most remote 1500 SQFT or area of the room (whichever is smaller), while allowing 250 GPM for hose streams.
      - 2) Sprinkler heads: 165 DEGF rated.
      - 3) Sprinkler head spacing: 130 SQFT maximum per head.
    - b. Multipurpose/Office:
      - 1) Coverage: Minimum discharge density of 0.1 GPM/SQFT over the hydraulically most remote 1500 SQFT, while allowing 100 GPM for hose streams.
      - 2) Sprinkler heads: 165 DEGF rated.
      - 3) Sprinkler head spacing: 225 SQFT maximum per head.

## 2.5 MAINTENANCE MATERIALS

- A. Sprinkler System:
- 1. Provide spare sprinkler heads in types and quantities required by NFPA 13.
    - a. Include sprinkler wrench and cabinet.
  - 2. Furnish one (1) emergency rubber ball shutoff on long handle to be used for temporary closing of sprinkler head after fire has been extinguished.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Cooperate with other trades to insure adequate space for equipment and piping placement.
- B. Review plans, Specifications and Shop Drawings of other trades to coordinate work.
- C. Do not begin installation until all Agency approvals are submitted to Engineer.

### 3.2 INSTALLATION

- A. General:
- 1. Install in strict accord with approved Shop Drawings.
  - 2. Install all piping, valves, and connections from mains to building fire protection systems.

**B. Piping, Valves and Accessories:**

1. Install sprinkler piping within first 6 IN of space under floor construction.
  - a. Where conditions of construction require piping installation at a lower elevation, route piping to avoid interference with work of other trades.
  - b. Offset, crossover and otherwise route piping to install system in available space.
    - 1) All offsets not shown.
  - c. Pitch all branch lines, cross mains, feed mains and risers to drainage points.
  - d. Provide angle drain valves at all low points.
    - 1) Plugs permitted at offsets when approved by local authority.
2. Provide OS&Y valve and flow switch within sprinkler system at each of following locations:
  - a. Each zone takeoff within sprinkler piping system.
  - b. Each sprinkler branch takeoff from fire hose standpipe within combination sprinkler-standpipe system.
  - c. Base of all sprinkler risers.
3. Install monitor switch on each OS&Y or butterfly valve within fire protection piping system, including valve assembly at fire pump or sprinkler control, base of standpipe and sprinkler zone, and/or isolation valves and post indicator valve.
4. Provide auto ball drip valves at outside fire department connections between hose connection and check and/or shutoff valve.
5. Flush outside fire water mains prior to connecting to inside system.
6. Provide wall flange at each FDV and within FHC boxes when risers are concealed.
7. Install pressure gages at top of each standpipe and sprinkler risers and elsewhere as required by local authority.

**C. Sprinkler:**

1. Install in accord with approved Shop Drawings.
  - a. Modifications made to system design or arrangement after approval of drawings by local authority may only be made after receiving written approval of authority and Engineer.
  - b. Such modifications do not include minor relocations in piping or head placement.
  - c. Make all revisions in accord with NFPA 13.
2. Install approved dirt legs and drain valves at low points of all piping to permit complete drainage of system without disconnection of any piping.
  - a. Drain valves at base of risers to have 1-1/2 IN hose adapters matching threads of hose systems in the building.
3. Extend 2 IN main drain(s) and 1 IN inspector's test connections on ends of sprinkler branches to nearest floor drain or janitor's sink.
4. Provide chrome plated escutcheon plates at pipe penetrations of ceilings, floors and walls.
5. Do not install sprinkler heads through or with escutcheon plate covering suspended ceiling grids.
6. Install sprinkler system in cooling tower and make operational before installing fill.

**3.3 INSTALLATION OF HANGERS AND SUPPORTS**

- A. Support pipe by means of simple rod hangers from above or structural cross members from below.
- B. All hanger details, sketches, takeoffs, etc., shall be the responsibility of the Contractor.
  1. Hangers shall be selected by hanger manufacturer and shall meet the requirement of ASME B31.1, Paragraph 121 "Design of Pipe Supporting Elements."
- C. Hanger assemblies shall include hanger, washers, nuts, bolts, turnbuckles, rods, beam clamps, and all other items necessary to make a complete assembly.
- D. Support and Hanger Spacing:
  1. Support and Hanger Spacing shall follow the guidelines set in NFPA 13 Chapter 17.



**3.4 FIELD QUALITY CONTROL**

- A. Test sprinkler, including outside supplies, under hydrostatic pressure to 200 PSI for 2 HR period.
  - 1. Prove system tight to satisfaction of Engineer.
  - 2. Inside piping to show no leakage.
  - 3. Leakage in underground piping in accord with NFPA 24.
- B. Test complete alarm system including control and signal circuits wired by Electrical Contractor.
  - 1. Complete testing prior to acceptance by Owner.
- C. Provide services of factory trained engineer to supervise installation of sprinkler systems, conduct final field pump acceptance tests, and instruct Owner's personnel.
- D. Give advance notice and arrange for field tests and inspections by local authority, including paying for inspection fees and securing permits for same.
- E. Each hydraulically calculated system should be identified by a permanent placard attached to the base of the riser indicating the design characteristics of the system.
  - 1. Information on the placard should include the design density and area and the flow and pressure required at the base of the riser.

**END OF SECTION**



DIVISION 22

PLUMBING

THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 22 05 03**  
**PIPE AND PIPE FITTINGS - PLUMBING SYSTEMS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Plumbing Piping.
  - 2. Compressed Air Piping.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 22 05 29 – Hanger and Support for Plumbing Piping and Equipment
  - 4. Section 22 05 23 - General Duty Valves for Plumbing Applications.
  - 5. Section 40 42 00 - Pipe, Duct and Equipment Insulation.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Society of Mechanical Engineers (ASME):
    - a. B1.2, Gages and Gaging for Unified Screw Threads.
    - b. B31.1, Power Piping.
    - c. B31.3, Process Piping.
    - d. B31.9, Building Services Piping.
    - e. B40.100, Pressure Gauges and Gauge Attachments.
  - 2. ASTM International (ASTM):
    - a. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - b. A74, Standard Specification for Cast Iron Soil Pipe and Fittings.
    - c. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
    - d. A234, Standard Specification for Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
    - e. B32, Standard Specification for Solder Metal.
    - f. B88, Standard Specification for Seamless Copper Water Tube.
    - g. C564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
  - 3. American National Standards Institute (ANSI/ASTM):
    - a. B16.3, Malleable Iron Threaded Fittings.
    - b. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
    - c. B16.22, Wrought Copper and Bronze Solder - Joint Pressure Fittings.
    - d. B16.23, Cast Copper Alloy Solder Joint Drainage Fittings (DWV).
    - e. B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
  - 4. American Water Works Association (AWWA):
    - a. B300-10, Standard for Hypochlorites.
    - b. C110, Standard for Ductile-Iron and Gray-Iron Fittings.
    - c. C150, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
    - d. C151, Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
    - e. C203, Coal-Tar Protective Linings for Steel.
    - f. C206, Field Welding of Steel Water Pipe.
    - g. C207, Steel Pipe Flanges for Waterworks Service.
    - h. C606, Grooved and Shouldered Joints.
    - i. C651, Disinfecting Water Mains.
    - j. M11, Steel Pipe- A Guide for Design and Installation.
  - 5. American Welding Society (AWS):

- a. A5.8M/A5.8, Specification for Filler Metals for Brazing and Braze Welding.
- 6. Cast Iron Soil Pipe Institute (CISPI):
  - a. 301, Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- 7. Building code:
  - a. International Code Council (ICC):
    - 1) International Plumbing Code and associated standards, 2015 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
  - 1. Use only certified welders meeting procedures and performance outlined in ASME Section IX, AWWA C200 Section 3.3.3 and other codes and requirements per local building and utility requirements.

### 1.3 SUBMITTALS

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation.
    - c. Separate schedule sheet for each piping system scheduled in this Specification Section showing compliance of all system components.
      - 1) Attach technical product data on gaskets, pipe, fittings, and other components.
  - 3. Welders' certificates.
- B. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- C. Informational Submittals:
  - 1. Qualifications of lab performing disinfection analysis on water systems.
  - 2. Test reports:
    - a. Copies of pressure test results on all piping systems.
    - b. Reports defining results of dielectric testing and corrective action taken.
    - c. Disinfection test report.
    - d. Notification of time and date of piping pressure tests.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Couplings:
    - a. Dresser.
    - b. Smith-Blair.
  - 2. Mechanical Couplings:
    - a. Victaulic.
    - b. Tyler.
- B. No like, equivalent or "or-equal" item is permitted.

### 2.2 MATERIALS

- A. Piping Systems:
  - 1. Piping systems are scheduled by service in PART 3 of this specification.

**B. Pipe and Tube:**

1. Copper:
  - a. Type K, L, or M tube per ASTM B88.
  - b. Utilize only annealed (soft) type tubing where flared joints are used and drawn temper (hard) type tubing where soldered or brazed joints are used.
  - c. Fittings, per System Type:
    - 1) Cast copper or bronze (pressure): Per ASTM B16.18.
    - 2) Wrought copper or bronze (pressure, solder): ASTM B16.22.
    - 3) Cast copper or bronze (DWV): Per ASTM B16.23.
    - 4) Wrought copper or bronze (pressure, flared): Per ASTM B16.26.
  - d. Joints:
    - 1) Flared.
    - 2) Soldered or Brazed:
      - a) Above ground below 180 DEGF: ASTM B32 solder with a tin/antimony ratio of 95/5 and non-corrosive flux.
      - b) Above ground 180 DEGF and above: use brazing alloy with melting temperature above 1000 DEGF and suitable flux.
      - c) Buried: Silver solder per AWS A5.8M/A5.8.
      - d) Provide unions and valves and equipment.
    - 3) Mechanical Couplings:
      - a) Per ASTM A1476 with elastomeric gaskets suitable to temperature range of the fluid and stainless steel nuts and bolts.
  - e. Unions: Class 150, bronze.
2. Stainless Steel:
  - a. Schedule 10, 40 or 80 per ASTM A53.
  - b. Finish: Black or hot-dip galvanized per ASTM A53.
  - c. Fittings: Per System Type:
    - 1) Malleable iron: Per ASTM B16.3.
    - 2) Forged Steel: Per ASTM A234.
    - 3) Cast Iron: Per ASTM A126.
  - d. Joints: Per System Type:
    - 1) Threaded.
      - a) With unions and valves and equipment.
    - 2) Flanged with rubber gaskets.
    - 3) Socket or butt welded.
  - e. Unions: Class 150, malleable iron, threaded.
3. Ductile Iron:
  - a. Pressure class per system type per AWWA C150 or AWWA C151.
  - b. Fittings: Ductile or gray iron per AWWA C110, standard thickness
  - c. Joints, per System Type:
    - 1) Flanged with rubber gasket.
    - 2) Grooved coupling per AWWA C606.
4. Cast Iron Soil Pipe
  - a. Service weight, ASTM A74.
  - b. Fittings, per System Type:
    - 1) Hubless per CISPI 310.
    - 2) Hub and spigot per ASTM A74.
  - c. Joints, per System Type:
    - 1) Neoprene gaskets and stainless steel clamp and shield assemblies per CISPI 310.
    - 2) Rubber gasket joint devices per ASTM C564.
    - 3) Lead and oakum per ASTM C564.
  - d. Coatings:
    - 1) Bituminous.

**2.3 MANUFACTURED UNITS****A. Unions:**

1. Copper pipe:
  - a. Copper ground joint unions for pipe sizes 2 IN and smaller.
  - b. Brass flanged unions for pipe sizes larger than 2 IN.
- B. Couplings:
  1. Ductile Iron pipe:
    - a. Flanged:
      - 1) Steel sleeve flange and followers.
      - 2) Grade 30 rubber gasket.
      - 3) Flanges to meet standards of adjoining flanges.
    - b. Compression sleeve:
      - 1) Steel sleeve and followers.
      - 2) Flanges to meet standards of adjoining flanges.
      - 3) Provide field coating for buried couplings per AWWA C203.
    - c. Mechanical couplings:
      - 1) In accordance with AWWA C606.

## 2.4 ACCESSORIES

- A. Bellows-type Expansion Fitting:
  1. Single sphere style stainless steel construction.
  2. Pressure rating: 125 PSIG.
  3. Temperature Rating: 250 DEGF.
  4. Maximum Compression: 1-3/4 IN.
  5. Maximum Extension: 1/4 IN.
  6. Joint: As specified for individual piping system.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Ream pipe and tube ends.
- B. Remove burrs.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment with flanges and unions.
- E. Deep open ends of pipe free from scale and dirt.
- F. Protect open ends with temporary plugs or caps.

### 3.2 EXTERIOR BURIED PIPING INSTALLATION

- A. Unless otherwise shown on the Drawings, provide a minimum of 4 FT and maximum of 8 FT earth cover over exterior buried piping systems and appurtenances conveying water, fluids, or solutions subject to freezing.
- B. Enter and exit through structure walls, floors, and ceilings by using penetrations and seals specified in Specification Section 01 73 20 and as shown on Drawings.
- C. When entering or leaving structures with buried mechanical joint piping, install joint within 2 FT of point where pipe enters or leaves structure.
  1. Install second joint not more than 6 FT or less than 4 FT from first joint.
- D. Install expansion devices as necessary to allow expansion and contraction movement.
- E. Laying Pipe in Trench:
  1. Excavate and backfill trench in accordance with Specification Section 31 23 33.
  2. Clean each pipe length thoroughly and inspect for compliance to specifications.
  3. Grade trench bottom and excavate for pipe bell and lay pipe on trench bottom.

4. Install gasket or joint material according to manufacturer's directions after joints have been thoroughly cleaned and examined.
  5. Except for first two joints, before making final connections of joints, install two full sections of pipe with earth tamped along side of pipe or final with bedding material placed.
  6. Lay pipe in only suitable weather with good trench conditions.
    - a. Never lay pipe in water except where approved by Engineer.
  7. Seal open end of line with watertight plug if pipe laying stopped.
  8. Remove water in trench before removal of plug.
- F. Lining Up Push-On Joint Piping:
1. Lay piping on route lines shown on Drawings.
  2. Deflect from straight alignments or grades by vertical or horizontal curves or offsets.
  3. Observe maximum deflection values stated in manufacturer's written literature.
  4. Provide special bends when specified or where required alignment exceeds allowable deflections stipulated.
  5. Install shorter lengths of pipe in such length and number that angular deflection of any joint, as represented by specified maximum deflection, is not exceeded.
- G. Anchorage and Blocking:
1. Provide reaction blocking, anchors, joint harnesses, or other acceptable means for preventing movement of piping caused by forces in or on buried piping tees, wye branches, plugs, or bends.
  2. Place concrete blocking so that it extends from fitting into solid undisturbed earth wall.
    - a. Concrete blocks shall not cover pipe joints.
  3. Provide bearing area of concrete in accordance with drawing detail.
- H. Install insulating components where dissimilar metals are joined together.

### 3.3 INTERIOR AND EXPOSED EXTERIOR PIPING INSTALLATION

- A. Install piping in vertical and horizontal alignment as shown on Drawings.
- B. Alignment of piping smaller than 4 IN may not be shown; however, install according to Drawing intent and with clearance and allowance for:
1. Expansion and contraction.
  2. Operation and access to equipment, doors, windows, hoists, moving equipment.
  3. Headroom and walking space for working areas and aisles.
  4. System drainage and air removal.
- C. Enter and exit through structure walls, floor and ceilings using penetrations and seals specified in Specification Section 01 73 20 and as shown on the Drawings.
- D. Install vertical piping runs plumb and horizontal piping runs parallel with structure walls.
- E. Pipe Support:
1. Use methods of piping support as shown on Drawings.
  2. Where pipes run parallel and at same elevation or grade, they may be grouped and supported from common trapeze-type hanger, provided hanger rods are increased in size as specified for total supported weight.
    - a. The pipe in the group requiring the least maximum distance between supports shall set the distance between trapeze hangers.
  3. Size pipe supports with consideration to specific gravity of liquid being piped.
- F. Locate and size sleeves and castings required for piping system.
1. Arrange for chases, recesses, inserts or anchors at proper elevation and location.
- G. Use reducing fittings throughout piping systems.
1. Bushings will not be allowed unless specifically approved.
- H. Equipment Drainage:
1. Provide drip pans and piping at equipment where condensation may occur.
  2. Avoid piping over electrical components such as motor control centers, panelboards, etc.



- a. If piping must be so routed, utilize 16 GA, 316 stainless steel drip pan under piping and over full length of electrical equipment.
  - b. Hard pipe drainage to nearest floor drain.
- I. Miscellaneous Piping:
  - 1. If system is not otherwise specified, provide stainless steel tubing.
  - 2. Size to handle application with 3/4 IN being minimum size provided.
- J. Unions:
  - 1. Install in position which will permit valve or equipment to be removed without dismantling adjacent piping.
  - 2. Mechanical type couplings may serve as unions.
  - 3. Additional flange unions are not required at flanged connections.
- K. Install expansion devices as necessary to allow expansion/contraction movement.
- L. Provide full face gaskets on all systems.
- M. Anchorage and Blocking:
  - 1. Block, anchor, or harness exposed piping subjected to forces in which joints are installed to prevent separation of joints and transmission of stress into equipment or structural components not designed to resist those stresses.
- N. Equipment Pipe Connections:
  - 1. Furnish and install sinks, fittings, strainers, pressure reducing valves, flow control valves, pressure relief valves, and shock absorbers which are not specified to be provided with or as integral part of equipment.
  - 2. For each water supply piping connection to equipment, furnish and install union and gate or angle valve.
    - a. Provide wheel handle stop valve at each laboratory sink water supply.
    - b. Minimum size: 1/2 IN.
  - 3. Furnish and install "P" trap for each waste piping connection to equipment if waste is connected directly to building sewer system.
    - a. Size trap as required by IPC.
  - 4. Stub piping for equipment, sinks, lavatories, supply and drain fittings, key stops, "P" traps, miscellaneous traps and miscellaneous brass through wall or floor and cap and protect until such time when later installation is performed.
- O. Provide insulating components where dissimilar metals are joined together.

### 3.4 ACCESS PROVISIONS

- A. Provide access doors or panels in walls, floors, and ceilings to permit access to valves, piping and piping appurtenances requiring service.
- B. Size of access panels to allow inspection and removal of items served, minimum 10 x 14 IN size.
- C. Fabricate door and frame of minimum 14 GA, stretcher leveled stock, cadmium plated or galvanized after fabrication and fitted with screw driver lock of cam type.
- D. Provide with key locks, keyed alike, in public use areas.
- E. Furnish panels with prime coat of paint.
- F. Style and type as required for material in which door installed.
- G. Where door is installed in fire-rated construction, provide door bearing UL label required for condition.

### 3.5 CATHODIC PROTECTION

- A. Isolate, dielectrically, all piping from all other metals including reinforcing bars in concrete slabs, other pipe lines, and miscellaneous metal.

- B. Make all connections from wire or cable by Thermit Cad welding accomplished by operators experienced in this process.
- C. Install all cables with a loop and overhead knot around each pipe and slack equal to at least 50 PCT of the straight line length.
- D. After cad welding, coat all exposed metallic surfaces with hot applied tape.

### 3.6 INSTALLATION – PIPE SYSTEM SPECIFIC

- A. Potable Water Piping Installation:
  - 1. Install drain tees with capped nipples of IPS brass 3 IN long at low points.
    - a. If low point occurs in concealed piping, provide approved flush access panel.
    - b. These drains are not shown on Drawings.
  - 2. Slope water lines down to drain points not less than 1 IN in 60 FT.
  - 3. Install all threaded piping with clean-cut tapered threads and with ends thoroughly reamed after cutting to remove burrs.
    - a. Pipe joint cement permitted only on external threads.
  - 4. For screwed nipples for connections to flush valves, lavatory supplies, and other equipment with threaded connections use iron, copper, or brass pipe.
  - 5. Install ball, butterfly and plug valves where indicated or required to adequately service all parts of system and equipment.
    - a. Install valves on each branch serving restroom.
    - b. Install valves on inlet and outlet connections of heat exchangers and on other equipment connected to water lines.
  - 6. Install unions between valves and connections to each piece of equipment, and install sufficient number of unions throughout piping system to facilitate installation and servicing.
    - a. On copper pipe lines, install wrought, solder-joint, copper to copper unions for lines 2 IN and smaller and, for lines 2-1/2 IN and over install brass flange unions.
  - 7. Construct and equip plumbing fixtures and equipment with anti-siphon devices as to entirely eliminate any danger of siphoning waste material into potable water supply system.
  - 8. Where exposed pipes 6 IN in size and smaller pass through floors, finished walls, or finished ceilings, fit with nickel or chrome-plated plates large enough to completely close hole around pipes.
    - a. Secure plates to pipe by set screw in approved manner.
  - 9. Size supply branches to individual fixtures as scheduled or indicated on Drawings.
  - 10. Install piping so as to be free to expand with proper loops, anchors and joints without injury to system or structure.
  - 11. Provide branches to wall hydrants or hose bibbs in exterior locations with interior shutoff and drain valves.
  - 12. Provide approved type vacuum breaker and backflow preventer installations indicated or as required by Code.
  - 13. Install concealed in finished structures such as administration and office facilities and at locations shown on Drawings.
- B. Soil and Waste Piping Installation:
  - 1. Install horizontal soil or waste lines less than 4 IN diameter with a slope of not less than 1/4 IN/FT or 2 PCT toward the point of disposal.
  - 2. Install 4 IN and larger piping at 1/8 IN/FT.
  - 3. Install as close to construction as possible to maintain maximum head room.
  - 4. Make changes of direction with 1/8 bends and junctions with wye fittings.
  - 5. Use short wye fittings in vertical pipe only.
  - 6. Install handhole test tee at base of each stack.
  - 7. Install cleanouts at dead ends, at changes of direction and at 50 FT intervals on horizontal runs.
    - a. Where cleanouts occur in concealed spaces, provide with extensions to floors above or to walls as required.

8. Install piping true to grade and alignment.
    - a. Begin at the system low point.
  9. Locate vertical extensions of underground piping below partition walls for concealment in wall.
    - a. In locations where hubs are wider than partition, set hubs 1 IN below final floor.
  10. Install concealed, in finished structures such as administration and office facilities and at locations shown on Drawings.
  11. For hub and spigot joints, install hub facing flow.
- C. Vent Piping Installation:
1. Run vent stack parallel to each soil or waste stack to receive branch vents from fixtures.
  2. Originate each vent stack from soil or waste pipe at its base.
  3. Where possible, combine soil, waste or vent stacks before passing through roof so as to minimize roof openings.
  4. Offset pipes running close to exterior walls away from such walls before passing through roof to permit proper flashing.
  5. Provide pipes passing through roofs with cast iron increaser's minimum of 12 IN below roof one size larger than pipe but in no case less than 4 IN.
  6. Terminate each vent with approved frost proof jacket.
  7. Carry vent stacks 4 IN and larger full size through roof.
    - a. Extend vent stacks at least 12 IN above roofing.
  8. Pipe vents from pressure regulating devices in compliance with local codes.
  9. Install concealed in finished structures such as administration and office facilities and at locations shown on Drawings.

### 3.7 JOINING

- A. Install products in accordance with manufacturer's instructions.
- B. Joining Methods - Flanges:
1. Facing method:
    - a. Insert slip-on flange on pipe.
    - b. Assure maximum tolerances for flange faces, from normal with respect to axis of pipe, is 0.005 IN per foot of flange diameter.
    - c. Test flanges after welding to pipe for true to face condition and reface, if necessary, to bring to specified tolerance.
  2. Joining method:
    - a. Leave 1/8 to 3/8 IN of flange bolts projecting beyond face of nut after tightening.
    - b. Coordinate dimensions and drillings of flanges with flanges for valves, pumps, equipment, tank, and other interconnecting piping systems.
    - c. When bolting flange joints, exercise extreme care to assure that there is no restraint on opposite end of pipe or fitting which would prevent uniform gasket compression or cause unnecessary stress, bending or torsional strains being applied to cast flanges or flanged fittings.
      - 1) Allow one flange free movement in any direction while bolts are being tightened.
    - d. Do not assemble adjoining flexible coupled, mechanical coupled or welded joints until flanged joints in piping system have been tightened.
    - e. Gradually tighten flange bolts uniformly to permit even gasket compression.
    - f. Do not overstress bolts to compensate for poor installation.
- C. Joining Method - Welded Joints:
1. Perform welding in accordance with AWWA C206 and this Section.
  2. For flange attachment perform in accordance with AWWA C207.
  3. Have each welding operator affix an assigned symbol to all his welds.
    - a. Mark each longitudinal joint at the extent of each operator's welding.
    - b. Mark each circumferential joint, nozzle, or other weld into places 180 DEG apart.
  4. Welding for all process piping shall conform to ASME B31.3.
    - a. Welding of utility piping 125 PSI and less shall be welded per ASME B31.9.

- b. Utility piping above 125 PSI shall conform to ASME B31.1.
  - 5. Provide caps, tees, elbows, reducers, etc., manufactured for welded applications.
  - 6. Weldolets may be used for 5 IN and larger pipe provided all slag is removed from inside the pipe.
  - 7. Weld-in nozzles may be used for branch connections to mains and where approved by Engineer.
  - 8. Use all long radius welding elbows for expansion loops and bends.
  - 9. Use long radius reducing welding elbows 90 DEG bends and size changes are required.
- D. Joining Method - Couplings:
- 1. Compression sleeve:
    - a. Install coupling to allow space of not less than 1/4 IN but not more than 1 IN.
    - b. Provide harnessed joint.
      - 1) Use joint harness arrangements detailed in AWWA M11.
    - c. Design harness assembly with adequate number of tie rods for test pressures indicated in Section 40 05 00 and allow for expansion of pipe.
    - d. Provide ends to be joined or fitted with compression sleeve couplings of the plain end type.
    - e. Grind smooth welds the length of one coupling on either side of joint to be fitted with any coupling.
    - f. Assure that outside diameter and out-of-round tolerances are within limits required by coupling manufacturer.
  - 2. Mechanical coupling:
    - a. Arrange piping so that pipe ends are in full contact.
    - b. Groove and shoulder ends of piping in accordance with manufacturer's recommendations.
    - c. Provide coupling and grooving technique assuring a connection which passes pressure testing requirements.
- E. Joining Method - Threaded and Coupled (T/C):
- 1. Provide T/C end conditions that meet ASME B1.2 requirements.
  - 2. Furnish pipe with factory-made T/C ends.
  - 3. Field cut additional threads full and clean with sharp dies.
  - 4. Leave not more than three pipe threads exposed at each branch connection.
  - 5. Ream ends of pipe after threading and before assembly to remove burrs.
  - 6. Use Teflon thread tape on male thread in mating joints.

### 3.8 FIELD QUALITY CONTROL

- A. Pipe Testing - General:
- 1. Test piping systems as follows:
    - a. Test exposed, non-insulated piping systems upon completion of system.
    - b. Test exposed, insulated piping systems upon completion of system but prior to application of insulation.
    - c. Test concealed interior piping systems prior to concealment and, if system is insulated, prior to application of insulation.
    - d. Test buried piping (insulated and non-insulated) prior to backfilling and, if insulated, prior to application of insulation.
  - 2. Isolate equipment which may be damaged by the specified pressure test conditions.
  - 3. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
    - a. Select each gage so that the specified test pressure falls within the upper half of the gage's range.
    - b. Notify the Engineer 24 HRS prior to each test.
  - 4. Completely assemble and test new piping systems prior to connection to existing pipe systems.
  - 5. Acknowledge satisfactory performance of tests and inspections in writing to Engineer prior to final acceptance.

6. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.
- B. Pressure Testing:
  1. Testing medium:
    - a. Water systems: Water.
    - b. Waste and drain systems: Water.
    - c. Air systems: Water or air.
  2. Testing pressure:
    - a. See below for gravity systems.
    - b. For pumped systems, test at no less than 125 PCT of pump head plus the system fill pressure.
    - c. For pressurized systems, test at 150 PSIG.
  3. Allowable leakage rates:
    - a. All exposed piping systems, all pressure piping systems and all buried, insulated piping systems which are hydrostatically pressure tested shall have zero leakage at the specified test pressure throughout the duration of the test.
    - b. Non-hazardous gas and air systems which are tested with air shall have a maximum pressure drop of 5 PCT of the specified test pressure throughout the duration of the test.
  4. Hydrostatic pressure testing methodology:
    - a. General:
      - 1) All joints, including welds, are to be left exposed for examination during the test.
      - 2) Provide additional temporary supports for piping systems designed for vapor or gas to support the weight of the test water.
      - 3) Provide temporary restraints for expansion joints for additional pressure load under test.
      - 4) Isolate equipment in piping system with rated pressure lower than pipe test pressure.
      - 5) Do not paint or insulate exposed piping until successful performance of pressure test.
    - b. Soil, waste, drain and vent systems:
      - 1) Test at completion of installation of each stack or section of piping by filling system with water and checking joints and fittings for leaks.
      - 2) Eliminate leaks before proceeding with work or concealing piping.
      - 3) Minimum test heights shall be 10 FT above highest stack inlet.
  5. Air testing methodology:
    - a. General:
      - 1) Assure air is ambient temperature.
    - b. Low pressure air testing:
      - 1) Place plugs in line and inflate to 25 PSIG.
      - 2) Check pneumatic plugs for proper sealing.
      - 3) Introduce low pressure air into sealed line segment until air pressure reaches 4 PSIG greater than ground water that may be over the pipe.
        - a) Use test gage conforming to ASME B40.100 with 0 to 15 PSI scale and accuracy of 1 PCT of full range.
      - 4) Allow 2 minutes for air pressure to stabilize.
      - 5) After stabilization period (3.5 PSIG minimum pressure in pipe) discontinue air supply to line segment.
      - 6) Record pressure at beginning and end of test.
  - C. Dielectric Testing Methods and Criteria:
    1. Provide electrical check between metallic non-ferrous pipe or appurtenances and ferrous elements of construction to assure discontinuity has been maintained.
    2. Wherever electrical contact is demonstrated by such test, locate the point or points of continuity and correct the condition.

### 3.9 CLEANING, DISINFECTION AND PURGING

#### A. Cleaning:

1. Clean interior of piping systems thoroughly before installing.
2. Maintain pipe in clean condition during installation.
3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
4. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other foreign materials which may have entered the system.
5. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
  - a. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.
  - b. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.
6. Clean chlorine piping in accordance with CI Pamphlet 6.

#### B. Disinfection of Potable Water Systems:

1. After favorable performance of pressure test and prior to Final Acceptance, thoroughly flush entire potable water piping system including supply, source and any appurtenant devices and perform disinfection as prescribed.
2. Perform work, including preventative measures during construction, in full compliance with AWWA C651.
3. Perform disinfection using sodium hypochlorite complying with AWWA B300-10.
4. Flush each segment of system to provide flushing velocity of not less than 2.5 FT per second.
5. Drain flushing water to sanitary sewer.
  - a. Do not drain flushing water to receiving stream.
6. Use continuous feed method of application.
  - a. Tag system during disinfection procedure to prevent use.
7. After required contact period, flush system to remove traces of heavily chlorinated water.
8. After final flushing and before placing water in service, obtain an independent laboratory approved by the Owner to collect samples and test for bacteriological quality.
  - a. Repeat entire disinfection procedures until satisfactory results are obtained.
9. Secure and deliver to Owner, satisfactory bacteriological reports on samples taken from system.
  - a. Ensure sampling and testing procedures are in full compliance to AWWA C651, local water purveyor and applicable requirements of State of Florida.

### 3.10 SCHEDULES

#### A. System 1 - Potable Water:

1. Piping symbol and service:
  - a. PWC – Potable Water Cold.
  - b. PWH – Potable Water Hot.
  - c. TW – Tempered Water.
  - d. An “R” designation after piping symbol denotes Recirculation.
2. Above ground, less than 3 IN DIA:
  - a. Pipe: Type L Copper.
  - b. Fittings: Wrought Copper or bronze.
  - c. Joints: Brazed or Soldered.
3. Above ground, 3 IN DIA and larger:
  - a. Pipe: Ductile Iron, Class 150.
  - b. Fittings: Ductile or Gray Iron.
  - c. Joints: Flanged or grooved mechanical couplings.
4. Buried, less than 3 IN DIA:
  - a. Pipe: Type K Copper.

- b. Fittings: Cast or Wrought Copper.
    - c. Joints: Flared.
  - 5. Buried, 3 IN DIA and larger:
    - a. Pipe: Ductile Iron, Class 150.
    - b. Fittings: Ductile or Gray Iron.
    - c. Joints: Push-on mechanical stuffing box type at fittings and valves.
- B. System 3 - Waste and Vent:
  - 1. Piping symbol and service:
    - a. WST – Waste.
    - b. SAN – Sanitary Sewer.
    - c. V – Vent.
    - d. SD – Storm Drain.
  - 2. Above ground, less than 2 IN DIA:
    - a. Pipe: Schedule 40 Galvanized Steel.
    - b. Fittings: Cast Iron DWV.
    - c. Joints: Threaded.
  - 3. Above ground, 2 IN DIA and larger:
    - a. Pipe: Cast Iron Drainage Pipe.
    - b. Fittings: Cast Iron DWV.
    - c. Joints: No hub.
  - 4. Buried:
    - a. Pipe: Cast Iron Drainage Pipe.
    - b. Fittings: Cast Iron DWV.
    - c. Joints: Hub and Spigot.
- C. System 4 - Condensate and Equipment Drains:
  - 1. Piping symbol and service:
    - a. CD – Condensate Drain.
    - b. ED – Equipment Drain.
  - 2. Above Ground (gravity drainage):
    - a. Pipe: DWV grade PVC.
    - b. Fittings: DWV PVC.
    - c. Joints: Solvent Weld.
  - 3. Above ground (pumped):
    - a. Pipe: Schedule 40 PVC or CPVC (for systems above 100 DEGF).
    - b. Fittings: Schedule 40 PVC or CPVC to match pipe.
    - c. Joints: Solvent weld.
- D. System 5 - Compressed Air:
  - 1. Piping symbol and service:
    - a. CA – Compressed Air.
  - 2. 1 IN DIA and smaller:
    - a. Pipe: 304L Stainless Steel Tubing.
    - b. Fittings: 304L Stainless Steel Compression type fittings.
    - c. Joints: Compression type couplings.
  - 3. Larger than 1 IN DIA:
    - a. Pipe: Schedule 40 Black Steel.
    - b. Fittings: Malleable Iron or Forged Steel.
    - c. Joints: Threaded.

**END OF SECTION**

**SECTION 22 05 23**  
**GENERAL-DUTY VALVES FOR PLUMBING PIPING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Gate valves.
  - 2. Ball valves.
  - 3. Check valves.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 22 05 03 - Pipe and Pipe Fittings - Plumbing Systems.

**1.2 REFERENCES**

- A. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS):
  - 1. SP 70, Cast Iron Gate Valves, Flanged and Threaded Ends.
  - 2. SP 71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
  - 3. SP 80, Bronze Gate, Globe, Angle and Check Valves.
  - 4. SP 110, Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.
  - 3. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.
- B. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

**1.4 QUALITY ASSURANCE**

- A. For drinking water service, provide valves complying with NSF 61.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Apollo.
  - 2. Crane.
  - 3. DeZurik.
  - 4. Milwaukee Valve Co.
  - 5. Nibco, Inc.
  - 6. Stockham.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.



**2.2 GATE VALVES**

- A. 2 IN and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, threaded bonnet, non-rising stem, lock-shield stem, inside screw with back-seating stem, solid wedge disc, alloy seat rings, ends.
- B. 2-1/2 IN and Larger: MSS SP 70, Class 125, cast iron body, bronze trim, bolted bonnet, rising stem, hand-wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends. Furnish chain-wheel operators for valves 6 IN and larger mounted over 8 FT above floor.

**2.3 BALL VALVES**

- A. 2 IN and Smaller: MSS SP 110, 400 PSIWOG, one piece bronze body, chrome plated brass ball, regular port, teflon seats, blow-out proof stem, solder or threaded ends with union, lever handle.
- B. 2 IN and Smaller: MSS SP 110, Class 150, bronze, two piece body, chrome plated bronze ball, regular port, teflon seats, blow-out proof stem, solder or threaded ends with union, lever handle.

**2.4 CHECK VALVES**

- A. Horizontal Swing Check Valves:
  - 1. 2 IN and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, solder or threaded ends.
- B. Spring Loaded Check Valves:
  - 1. 2 IN and Smaller: MSS SP 80, Class 250, bronze body, in-line spring lift check, silent closing, Buna-N disc, integral seat, solder or threaded ends.
  - 2. 2-1/2 IN and Larger: MSS SP 71, Class 125, wafer style, cast iron body, bronze seat, center guided bronze disc, stainless steel spring and screws, flanged ends.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Install valves with stems upright or horizontal, not inverted.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install 3/4 IN gate valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
- D. Install valves with clearance for installation of insulation and allowing access.
- E. Provide access where valves and fittings are not accessible.
- F. Refer to Section 22 05 29 for pipe hangers.
- G. Refer to Section 22 05 03 for piping materials applying to various system types.

**3.2 VALVE APPLICATIONS**

- A. Install ball or gate valves for drain service at locations indicated on Drawings in accordance with this Section.
- B. Install ball butterfly or gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- C. Install ball butterfly or globe valves for throttling, bypass, or manual flow control services.
- D. Install spring loaded check valves on discharge of water pumps.
- E. Install lever and weight check valves on discharge of pumps in pumped sanitary piping.
- F. Install lug end butterfly valves adjacent to equipment when functioning to isolate equipment.

- G. Install ball butterfly and gate valves in domestic water systems for shut-off service.
- H. Install ball and butterfly valves in domestic water systems for throttling service.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 22 05 29**  
**HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Pipe hangers and supports.
  - 2. Hanger rods.
  - 3. Flashing.
- B. Related Sections:
  - 1. Section 03 09 00 - Concrete.
  - 2. Section 07 92 00 - Joint Sealants.
  - 3. Section 22 05 03 - Pipes and Tubes for Plumbing Piping and Equipment.

**1.2 REFERENCES**

- A. American Society of Mechanical Engineers (ASME):
  - 1. B31.1, Power Piping.
  - 2. B31.5, Refrigeration Piping.
  - 3. B31.9, Building Services Piping.
- B. ASTM International (ASTM):
  - 1. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 2. F708, Standard Practice for Design and Installation of Rigid Pipe Hangers.
- C. American Welding Society (AWS):
  - 1. D1.1, Structural Welding Code - Steel.
- D. FM Global (FM):
  - 1. Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.
- E. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS):
  - 1. SP 58, Pipe Hangers and Supports - Materials, Design and Manufacturer.
  - 2. SP 69, Pipe Hangers and Supports - Selection and Application.
  - 3. SP 89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- F. Underwriters Laboratories Inc. (UL):
  - 1. 723, Tests for Surface Burning Characteristics of Building Materials.
- G. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.
- C. Product Data:
  - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
- D. Manufacturer's Installation Instructions:
  - 1. Hangers and Supports: Submit special procedures and assembly of components.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

**1.4 QUALITY ASSURANCE**

- A. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- B. Perform Work in accordance with applicable authority and AWS D1.1 for welding hanger and support attachments to building structure.

**1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum 5 years documented experience.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 65 50 - Product Delivery, Storage and Handling.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

**1.7 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**1.8 WARRANTY**

- A. Furnish five year manufacturer warranty for pipe hangers and supports.

**PART 2 - PRODUCTS****2.1 PIPE HANGERS AND SUPPORTS**

- A. Manufacturers:
  - 1. Anvil International.
  - 2. PHD Manufacturing.
  - 3. Cooper B-Line.
  - 4. Erico International.
  - 5. Tolco Inc.
- B. Compressed Air Piping – CA
  - 1. Piping/tubing shall be spaced no closer than 4 IN together and no more than 6 IN apart.
  - 2. Pipe sizes 1-1/2 IN or smaller shall be supported every 6 FT. pipe sizes 2 IN through 4 IN shall be supported every 10 FT.
  - 3. Hanger rod shall be 3/8" IN diameter.
  - 4. Provide stainless steel hanger system and rod in all high humidity areas, provide galvanized finish in all other areas.
  - 5. Clamp shall have cushions.
- C. Plumbing Piping - DWV:
  - 1. Conform to MSS SP58 MSS SP69.
  - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 IN: Malleable iron, adjustable swivel, split ring.
  - 3. Wall Support for Pipe Sizes 3 IN and Smaller: Cast iron hook.
  - 4. Vertical Support: Steel riser clamp.
  - 5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  - 6. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.
- D. Plumbing Piping - Water:
  - 1. Conform to MSS SP58 MSS SP69.

2. Hangers for Pipe Sizes 1/2 to 1-1/2 IN: Malleable iron, adjustable swivel, split ring.
3. Wall Support for Pipe Sizes 3 IN and Smaller: Cast iron hook.
4. Vertical Support: Steel riser clamp.
5. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
6. Floor Support for Hot Pipe Sizes 4 IN and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
7. Copper Pipe Support: Copper-plated, Carbon-steel ring.

## 2.2 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.
  1. Electro-galvanized or cadmium plated after threads are cut.

## 2.3 INSERTS

- A. Manufacturers:
  1. Hilti.
  2. Simpson.
  3. Tolco.
  4. Cooper B-Line.
  5. Grinnell.
- B. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

## 2.4 FLASHING

- A. Metal Flashing: 26 gage thick galvanized steel.
- B. Metal Counter flashing: 22 gage thick galvanized steel.
- C. Lead Flashing:
  1. Waterproofing: 5 LB/SQFT sheet lead.
  2. Soundproofing: 1 LB/SQFT sheet lead.
- D. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

## 2.5 SLEEVES

- A. Sealant: Acrylic.

## 2.6 MECHANICAL SLEEVE SEALS

- A. Manufacturers:
  1. GPT Industries
  2. Proco Products, Inc.
  3. Flexicraft Industries.
- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

## 2.7 FORMED STEEL CHANNEL

- A. Manufacturers:
  1. Unistrut Corporation.
  2. Cooper B-Line.
  3. Erico.
- B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 IN on center.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify openings are ready to receive sleeves.

**3.2 PREPARATION**

- A. Remove incompatible materials affecting bond.
- B. Install backing materials to arrest liquid material leakage.
- C. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- D. Do not drill or cut structural members.

**3.3 INSTALLATION - INSERTS**

- A. Install inserts for placement in concrete forms.
- B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 IN and larger.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

**3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS**

- A. Install in accordance with ASME B31.1 ASME B31.5 ASME 31.9 MSS SP 58 MSS SP 69.
- B. Support horizontal piping as scheduled.
- C. Install hangers with minimum 1/2 IN space between finished covering and adjacent work.
- D. Place hangers within 12 IN of each horizontal elbow.
- E. Use hangers with 1-1/2 IN minimum vertical adjustment.
- F. Support horizontal cast iron pipe adjacent to each hub, with 5 FT maximum spacing between hangers.
- G. Support vertical piping at every other floor. Support vertical cast iron pipe at each floor at hub.
- H. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- I. Support riser piping independently of connected horizontal piping.
- J. Provide copper plated hangers and supports for copper piping.
- K. Design hangers for pipe movement without disengagement of supported pipe.
- L. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- M. Provide clearance in hangers and from structure and other equipment for installation of insulation.

**3.5 INSTALLATION - FLASHING**

- A. Provide flexible flashing and metal counterflashing where piping penetrates weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 IN minimum above finished roof surface with lead worked 1 IN minimum into hub, 8 IN minimum clear on sides with 24 x 24 IN sheet size. For pipes through outside walls, turn flanges back into wall and seal, metal counter-flash, and seal.

- C. Flash floor drains in floors with topping over finished areas with lead, 10 IN clear on sides with minimum 36 x 36 IN sheet size. Fasten flashing to drain clamp device.
- D. Seal floor and water cooler drains watertight to adjacent materials.
- E. Adjust storm collars tight to pipe with bolts; seal around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

### 3.6 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with mechanical sleeve seals.
- B. Set sleeves in position in forms. Provide reinforcing around sleeves.
- C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- D. Extend sleeves through floors 1 inch above finished floor level. Seal sleeves.
- E. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with stuffing insulation and sealant airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- F. Install chrome plated steel escutcheons at finished surfaces.

### 3.7 SCHEDULES

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HANGER SPACING FEET	HANGER ROD DIAMETER INCHES
Cast Iron (All Sizes)	5	5/8
Cast Iron (All Sizes) with 10 FT length of pipe	10	5/8
Copper Tube, 1-1/4 IN and smaller	6	1/2
Steel, 3 IN and smaller	12	1/2

**END OF SECTION**



THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 22 05 53**  
**IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Nameplates.
  - 2. Tags.
  - 3. Pipe markers.
  - 4. Labels.

**1.2 REFERENCES**

- A. American Society of Mechanical Engineers (ASME):
  - 1. A13.1, Scheme for the Identification of Piping Systems.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturers catalog literature for each product required.
- C. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

**1.4 CLOSEOUT SUBMITTALS**

- A. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

**1.5 QUALITY ASSURANCE**

- A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.
- B. Maintain one copy of each document on site.

**PART 2 - PRODUCTS****2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Nameplates and Tags:
    - a. WH Brady Company.
    - b. Panduit.
    - c. Seton.
    - d. National Band and Tag Company.
    - e. Carlton Industries, Inc.

**2.2 NAMEPLATES**

- A. Laminated two-layer phenolic or DR (high impact) acrylic with engraved black letters on light contrasting background color.
  - 1. Thickness: Minimum 1/16 IN.

2. Color: Manufacturer standard or as specified.
- B. Alternate: Laminated three-layer plastic with engraved blackletters on light contrasting background color.
  1. Thickness: Minimum 60 mils.
  2. Color: Manufacturer standard or as specified.

## **2.3 TAGS**

- A. Nonmetallic Tags:
  1. Fiberglass reinforced engraved blackletters on light contrasting background color.
    - a. Tag size: Minimum 1-1/2 IN diameter.
    - b. Thickness: Minimum 100 mils.
    - c. Color: Manufacturer standard or as specified.
- B. Metal Tags:
  1. Aluminum or stainless steel disc with stamped letters and finished edges.
    - a. Tag size: Minimum 1-1/2 IN diameter.
    - b. Thickness: Minimum 0.035 IN (20 Ga).
    - c. Color: Black color filled into stamped text with natural metal background.
- C. Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame.

## **2.4 SELF ADHESIVE PIPE AND EQUIPMENT MARKERS**

- A. Color and Lettering: Conform to ASME A13.1.
- B. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
  1. Thickness: Minimum 5 mils.
  2. Letter Height:
    - a. Up to 2 IN Outside Diameter of Insulation or Pipe: 1/2 IN high letters.
    - b. 2-1/2 to 6 IN Outside Diameter of Insulation or Pipe: 1 IN high letters.
    - c. Over 6 IN Outside Diameter of Insulation or Pipe: 1-3/4 IN high letters.
    - d. Equipment: 1-3/4 IN high letters.
  3. Indoor/outdoor grade.
  4. Weather and UV resistant inks.
  5. Permanent adhesive.

## **2.5 UNDERGROUND WARNING TAPE**

- A. Description: Polyethylene tape with metallic core for detection and location of piping with metal detector resistant to acids, alkalis and other soil components.
  1. Size: 0.004 IN thick; 6 IN wide.
  2. Color: As Specified.
  3. Service Marking: Printed text as selected by Architect/Engineer in black color and repeated at maximum 40 IN intervals.

# **PART 3 - EXECUTION**

## **3.1 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

## **3.2 INSTALLATION**

- A. Install identifying devices after completion of coverings and painting.
- B. All identification devices to be printed by mechanical process. Hand printing is not acceptable.
- C. Install nameplates with adhesive where equipment has sufficient surface area and texture.
  1. Attach tags with 1/8 IN flat head screws where adhesive application is not suitable.
  2. Attach tabs with plastic strap where screws should not or cannot penetrate substrate.

- D. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer.
- E. Install tags using corrosion resistant chain. Number tags consecutively by location.
- F. Tag single items of equipment enclosed in a housing or compartment on outside of housing.
  - 1. Tag multiple items mounted inside a housing or compartment individually inside the housing.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify valves in main and branch piping with tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.
- J. Identify piping, concealed or exposed, with pipe markers. Use tags on piping 3/4 IN diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 FT on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

### 3.3 SCHEDULES

- A. Above Grade Piping:
  - 1. Install labels on all piping in accordance with Article 3.2.
    - a. Self-adhesive labels.
  - 2. Color Coding: Per ASME A13.1.
    - a. White lettering on green background:
      - 1) Low temperature water:
        - a) Domestic Cold Water
        - b) Nonpotable Water
        - c) Compressed Air
    - b. White lettering on blue background:
      - 1) Compressed Air.
- B. Below Grade Piping
  - 1. Use underground warning tape in accordance with Article 3.2.
    - a. Lettering: Minimum: 1-1/4 IN.
    - b. Wording:
      - 1) First line: "CAUTION CAUTION CAUTION"
      - 2) Second line: "BURIED (Pipe Descriptor) LINE BELOW"
    - c. Pipe Descriptors and color coding:
      - 1) Sewer or Waste: Black Lettering on Green Background.
      - 2) Water (potable): Black lettering on blue background.
- C. Valves:
  - 1. Install on all manual valves:
    - a. Number and schedule all valves utilized on project.
  - 2. Utilize nonmetallic or metal tags.
    - a. Use stainless steel metal tags only for corrosive areas.
- D. Equipment:
  - 1. Provide nameplate as warranted per Article 3.2.
  - 2. Label with equipment tag as shown on the Drawings.
    - a. Black lettering on white background.
  - 3. Provide OSHA warning sign for equipment that starts automatically.
  - 4. Label all equipment control panels located remote from unit.
  - 5. Label all thermostats with self-adhesive markers with tag of equipment served.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 22 15 00**  
**GENERAL SERVICE COMPRESSED-AIR SYSTEMS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Compressed air piping.
  - 2. Unions and flanges.
  - 3. Valves.
  - 4. Strainers.
  - 5. Pipe hangers and supports.
  - 6. Flexible connectors.
  - 7. Relief valves.
  - 8. Compressed air outlets.
  - 9. Air compressor.
  - 10. Air receiver.
  - 11. Hose connectors.
- B. Related Sections:
  - 1. Section 22 05 03 - Pipes and Tubes for Plumbing Piping and Equipment: Product and installation requirements for piping materials applying to various system types.
  - 2. Section 22 05 23 - General-Duty Valves for Plumbing Piping: Product requirements for valves for placement by this section.
  - 3. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: Product requirements for pipe hangers and supports for placement by this section.
  - 4. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Product requirements for pipe and valve identification for placement by this section.

**1.2 REFERENCES**

- A. American Society of Mechanical Engineers (ASME):
  - 1. B16.3, Malleable Iron Threaded Fittings.
  - 2. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
  - 3. B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - 4. B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
  - 5. B31.1, Power Piping.
  - 6. B31.9, Building Services Piping.
  - 7. Section VIII, Boiler and Pressure Vessel Code - Pressure Vessels.
  - 8. Section IX, Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- B. ASTM International (ASTM):
  - 1. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
  - 2. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
  - 3. A234/A234M, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
  - 4. A312/A312M, Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
  - 5. A395/A395M, Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
  - 6. A536, Standard Specification for Ductile Iron Castings.
  - 7. B32, Standard Specification for Solder Metal.
  - 8. B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
  - 9. B88, Standard Specification for Seamless Copper Water Tube.
  - 10. B584, Standard Specification for Copper Alloy Sand Castings for General Applications.

11. D2513, Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
  12. D2683, Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
  13. F1281, Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.
  14. F1282, Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.
  15. F1476, Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
- C. American Welding Society (AWS):
1. A5.8, Specification for Filler Metals for Brazing and Braze Welding.
  2. D1.1, Structural Welding Code - Steel.
- D. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS):
1. SP 58, Pipe Hangers and Supports - Materials, Design and Manufacturer.
  2. 67, Butterfly Valves.
  3. SP 69, Pipe Hangers and Supports - Selection and Application.
  4. SP 70, Cast Iron Gate Valves, Flanged and Threaded Ends.
  5. SP 71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
  6. SP 80, Bronze Gate, Globe, Angle and Check Valves.
  7. SP 89, Pipe Hangers and Supports - Fabrication and Installation Practices.
  8. SP 110, Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- E. National Electrical Manufacturers Association (NEMA):
1. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
- F. NSF International (NSF):
1. 61, Drinking Water System Components - Health Effects.

### 1.3 SUBMITTALS

- A. Shop Drawings: Indicate piping system schematic with electrical and connection requirements general assembly of components, mounting and installation details, and general layout of control and alarm panels.
- B. Product Data:
1. Piping: Submit data on pipe materials, fittings, and accessories.
  2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
  3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
  4. System Components: Submit manufacturers catalog information including capacity, component sizes, rough-in requirements, and service sizes. When applicable, include electrical characteristics and connection requirements.
  5. Compressors: Submit type, capacity, and performance characteristics. Include electrical characteristics and connection requirements.
- C. Product Data: Submit manufacturers catalog literature with capacity, weight, and electrical characteristics and connection requirements.
- D. Manufacturer's Installation Instructions: Submit hoisting and setting requirements, starting procedures.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

### 1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of equipment piping, valves, outlets and components.
- B. Operation and Maintenance Data: Submit assembly views, lubrication instructions, replacement part numbers and availability.

**1.5 QUALITY ASSURANCE**

- A. Perform Work in accordance with ASME B31.1 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- B. Perform Work in accordance with applicable authority for welding hanger and support attachments to building structure.
- C. Perform Work in accordance with State of FL standard.
- D. Maintain one copy of each document on site.

**1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 5years documented experience.

**1.7 PRE-INSTALLATION MEETINGS**

- A. Convene minimum one week prior to commencing work of this section.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Accept equipment on site in factory fabricated containers with shipping skids and plastic pipe end protectors in place. Inspect for damage.
- B. Protect piping and equipment from weather and construction traffic. Maintain factory packaging and caps in place until installation.
- C. Deliver each length of piping with manufacturer's plugged or capped ends and keep sealed until installation.
- D. Deliver fittings, valves, and other components in sealed containers and keep sealed until installation.

**1.9 WARRANTY**

- A. Furnish five year manufacturer warranty for pumps, compressors, refrigerated dryers and valves excluding packing.

**1.10 MAINTENANCE MATERIALS**

- A. Furnish two quart containers of compressor oil.

**PART 2 - PRODUCTS****2.1 COMPRESSED AIR PIPING**

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.
  - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, forged steel welding type.
  - 2. Joints: Threaded for pipe 2 IN and smaller; welded for pipe 2-1/2 IN and larger.
- B. Copper Tubing: ASTM B88, Type M, drawn.
  - 1. Fittings: ASME B16.18 cast copper alloy or ASME B16.22, wrought copper and bronze.
  - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
  - 3. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.
- C. Copper Tubing: ASTM B88, Type M, drawn.
  - 1. Copper Press Fittings: Conforming to ASME B16.18 cast copper alloy or ASME B16.22, wrought copper and bronze with Nitrile O-ring seals.
  - 2. Joints: Compression type made with manufacturer's tool.



## 2.2 UNIONS AND FLANGES

- A. Unions for Pipe 2 IN and Smaller:
  - 1. Ferrous Piping: Class 150, malleable iron, threaded.
  - 2. Copper Piping: Class 150, bronze unions with soldered.
  - 3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
  - 4. Stainless Steel Piping: 300 PSIG, threaded type with compression type ends.

## 2.3 GATE VALVES

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. 2 IN and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, threaded bonnet, non-rising stem, lock-shield stem, inside screw with back-seating stem wedge disc, alloy seat rings, solder, or threaded ends.

## 2.4 BALL VALVES

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. 2 IN and Smaller: MSS SP 110, Class 150, bronze, two piece body, chrome plated bronze ball, full port, teflon seats, blow-out proof stem, solder or threaded ends with union, lever handle.

## 2.5 BUTTERFLY VALVES

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. 2-1/2 IN and Larger: MSS SP 67, Class 150.
  - 1. Body: Cast or ductile iron, wafer ends, stainless steel stem, extended neck.
  - 2. Disc: Nickel-plated ductile iron.
  - 3. Seat: Resilient replaceable Buna N.
  - 4. Handle and Operator: 10 position lever handle.

## 2.6 CHECK VALVES

- A. Horizontal Swing Check Valves:

### Manufacturers:

- 1. Furnish materials in accordance with State of FL standards.
- 2. 2 IN and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, solder or threaded ends.
- 3. 2-1/2 IN and Larger: MSS SP 71, Class 125, cast iron body, bolted cap, bronze or cast iron disc, renewable disc seal and seat, flanged ends.

## 2.7 STRAINERS

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. 2 IN and Smaller: Y pattern, ASTM B62 bronze body, threaded ends, Class 150, 1/16 IN 20 mesh stainless steel perforated screen.
- C. 2 IN and Smaller: Y pattern, ASTM A126 cast iron body, threaded ends, Class 250, 1/16 IN 20 mesh stainless steel perforated screen.
- D. 2-1/2 IN and Larger: Y pattern, ASTM A126 cast iron body, flanged ends, Class 125, with 1/8 IN20 stainless steel perforated screen.

## 2.8 PIPE HANGERS AND SUPPORTS

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. Conform to ASME B31.9.
- C. Hangers for Pipe Sizes 1/2 to 1-1/2 IN: Malleable iron, adjustable swivel, split ring.
- D. Wall Support for Pipe Sizes 3 IN and Smaller: Cast iron hooks.
- E. Vertical Support: Steel riser clamp.
- F. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- G. Copper Pipe Support: Copper-plated, carbon steel ring.

## **2.9 FLEXIBLE CONNECTORS**

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. 2 IN and Smaller: Corrugated bronze hose with single layer of bronze exterior braiding, Schedule 40 black steel copper tubing ends; maximum working pressure 170 PSIG, threaded or soldered connections.

## **2.10 RELIEF VALVES**

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. Relief Valves: Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.

## **2.11 COMPRESSED AIR OUTLETS**

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. Compressed Air Outlets: Quick Connector: 3/8 IN brass, snap on connector with self-closing valve, Style A.

## **2.12 AIR COMPRESSOR**

### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. Air Compressor: Simplex compressor unit consisting of air-cooled compressor, air receiver, after cooler, and operating controls.
- C. Reciprocating Compressors:
  - 1. Unit: Reciprocating compressor with positive displacement oil pump lubrication system, suction inlet screen, discharge service valves, on cast iron or welded steel base for motor and compressor with provision for V-belt adjustment.
  - 2. Automatic Capacity Reduction Equipment: Suction valve unloading device with lifting mechanism operated by oil pressure. Furnish unloaded compressor start.
  - 3. Motor: Constant speed 1800 RPM with electronic overheating protection in each phase with full voltage starting.
  - 4. Control Panel: Factory mounted and wired, NEMA 250 Type 1 enclosure, steel construction, with power and control wiring, molded-case disconnect switch, factory wired for single point power connection.
    - a. Starter: Furnish with manual reset current overload protection, starter relay, control power transformer, terminal strip for connection to interface equipment.
    - b. Safety Controls: Manually reset low oil pressure cutout.
    - c. Panel Face: Compressor run light, start-stop switch, elapsed time meter.

- D. Capacity: As scheduled.
- E. Electrical Characteristics: As scheduled.
- F. Controls:
  - 1. Pressure Switch: Line voltage contactor to break at 100 PSI with minimum differential of 20 PSI.
- G. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box.
- H. Disconnect Switch: Factory mount in control panel.
- I. Cord and Plug: Furnish unit with 6 FT cord and plug for connection to electric wiring system including grounding connector.

### **2.13 HOSE CONNECTORS**

#### Manufacturers:

- A. Furnish materials in accordance with State of FL standards.
- B. Hose Connectors: Corrugated stainless steel tubing with stainless steel wire braid covering and ends welded to inner tubing.
- C. Working Pressure: 250 PSIG minimum.
- D. End Connections:
  - 1. 2 IN and Smaller: Threaded steel pipe nipple.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify excavations are to required grade, dry, and not over-excavated.

### **3.2 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

### **3.3 INSTALLATION - HANGERS AND SUPPORTS**

- A. Install hangers and supports in accordance with ASME B31.1.
- B. Support horizontal piping as scheduled.
- C. Install hangers to provide minimum 1/2 IN space between finished covering and adjacent work.
- D. Place hangers within 12 IN of each horizontal elbow.
- E. Use hangers with 1-1/2 IN minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
- F. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
- G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- H. Provide copper plated hangers and supports for copper piping.

- I. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- J. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

### **3.4 INSTALLATION - ABOVE GROUND PIPING - COMPRESSED AIR SYSTEMS**

- A. Install drip connections with valves at low points of piping system.
- B. Install take-off to outlets from top of main, with shut off valve after take-off. Slope take-off piping to outlets.
- C. Install compressed air couplings, female quick connectors, and pressure gages where outlets are indicated.
- D. Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.
- E. Cut pipe and tubing accurately and install without springing or forcing.
- F. Slope piping in direction of flow.
- G. Copper Pipe with press-type Joints: Remove burrs and clean ends. Fully insert tubing into fitting and mark pipe ends to ensure full insertion into coupling or fitting. Check alignment against mark to assure tubing is fully inserted. Press joint using manufacturer's tool.
- H. Install pipe sleeves where pipes and tubing pass through walls, floors, roofs, and partitions. Refer to Section 22 05 29.
- I. Install pipe identification in accordance with Section 22 05 53.
- J. Except where indicated, install manual shut off valves with stem vertical and accessible for operation and maintenance.
- K. Install strainers on inlet side of pressure reducing valves. Install pressure reducing valves with bypasses and isolation valves to allow maintenance without interruption of service.
- L. Install Work in accordance with State of FL standards.

### **3.5 INSTALLATION - EQUIPMENT**

- A. Install air compressor on concrete housekeeping pad, minimum 3-1/2 IN high and 6 IN larger than compressor base on each side. Refer to Section 03 30 00.
- B. Install air compressor unit on vibration isolators.
- C. Install air valve and drain connection on horizontal casing.
- D. Install line size shut-off valve and check valve on compressor discharge.
- E. Install shut-off valve on water inlet to after cooler. Pipe drain to floor drain.
- F. Install condensate drain piping to nearest floor drain.

### **3.6 FIELD QUALITY CONTROL**

- A. Compressed Air Piping Leak Test: Prior to initial operation, clean and test compressed air piping in accordance with ASME B31.1.
- B. Verify for atmospheric pressure in piping systems, other than system under test.
- C. Test system with dry compressed air or dry nitrogen with test pressure in piping system at 50 PSI.

### **3.7 CLEANING**

- A. Blow systems clear of free moisture and foreign matter.

**3.8 SCHEDULES**

PIPE HANGER SPACING		
PIPE SIZE (IN)	MAXIMUM HANGER SPACING (FT)	HANGER ROD DIAMETER (IN)
1/2	7	3/8
3/4	7	3/8
1	7	3/8

**END OF SECTION**

## **SECTION 22 20 00 PLUMBING FIXTURES AND EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Plumbing fixtures, trim, and equipment.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 23 05 13 - Common Motor Requirements for Plumbing and HVAC Equipment.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Americans with Disabilities Act (ADA):
    - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
  - 2. American National Standards Institute (ANSI):
    - a. Z358.1, Emergency Eyewash and Shower Equipment.
  - 3. American Society of Heating, Refrigerating and Air Conditioning Engineers/Illuminating Engineering Society of North America (ASHRAE/IESNA):
    - a. 90.1 IP, Energy Standard for Buildings Except Low-Rise Residential Buildings.
  - 4. American Society of Mechanical Engineers (ASME):
    - a. A112.19.3, Stainless Steel Plumbing Fixtures (Designed for Residential Use).
  - 5. American Society of Sanitation Engineers (ASSE):
    - a. 1011, Performance Requirements for Hose Connection Vacuum Breaker.
  - 6. Canadian Standards Association (CSA).
  - 7. NSF International (NSF).
  - 8. Underwriters Laboratories, Inc. (UL).
  - 9. Building code:
    - a. International Code Council (ICC):
      - 1) International Building Code and associated standards, 2015 Edition including all amendments, referred to herein as Florida Building Code.
    - b. Local Codes:
      - 1) Florida.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. Color selection charts for Owner color selection.
  - 2. Fabrication and/or layout drawings:
    - a. Layout plan(s) showing dimensions, elevations, etc.
    - b. Details showing connections, installation, rough-in locations, etc.
  - 3. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Chemical-resistance data.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Emergency shower and eyewash:
  - a. Speakman.
  - b. Haws.
  - c. Guardian Equipment.
2. Drains and roof drains:
  - a. Wade.
  - b. Josam.
  - c. Zurn.
  - d. Smith.
3. Trap primer:
  - a. Precision Plumbing Products.
4. Hose reels:
  - a. Hannay and Son, Inc.
  - b. Aeromative Mfg Co.
5. Hose bibbs:
  - a. Nibco.
  - b. Woodford.

B. No like, equivalent or "or-equal" item or substitution is permitted.

## 2.2 MANUFACTURED UNITS

- A. Emergency Fixtures:
  1. Emergency shower and eye/face wash (ESEW):
    - a. ANSI Z358.1.
    - b. Deluge shower head:
      - 1) Stay-open ball valve.
      - 2) Pull-chain.
    - c. Eye/face wash:
      - 1) Aerated eye/face wash with stainless steel bowl.
      - 2) Stay-open full port ball valve.
      - 3) Push handle control for eye/face wash.
      - 4) Supply line strainer for eye/face wash.
    - d. Type:
      - 1) ESEW (free standing, cast flange base and pull-chain for shower): Guardian G1994.
- B. Drains and Roof Drains :
  1. Floor drain (FD):
    - a. Bottom outlet.
    - b. Clamping seepage flange.
    - c. Seepage openings.
    - d. Size as shown on Drawings.
    - e. Type: Cast iron body.
      - 1) FD (unfinished area) sediment bucket, bucket shall support grate: Wade W-1200-TD.
  2. Roof drain (RD):
    - a. Bottom outlet cast iron drain with flashing clamp, removable cast iron mushroom-type dome and cast iron deck clamp.
    - b. Provide cast iron extension flange (-DF) where insulation thickness exceeds 2 IN.
    - c. Type:
      - 1) RD: Wade W-3000.
- C. Traps:
  1. Floor and equipment drains:
    - a. Same material and coating as the piping system.
    - b. 3 IN minimum seal.
  2. Fixture drains:

- a. 2 IN minimum seal.
  - b. Cast brass.
  - c. Chrome plated.
  - d. Size as required.
- 3. Ventilation housing drains: Extra-deep seal sufficient to maintain seal against static pressure maintained in fan housing.
- D. Trap Primer:
  - 1. Body:
    - a. All brass construction.
    - b. 1/2 IN male NPT inlet.
    - c. 1/2 IN female NPT outlet.
    - d. Stainless steel debris screen.
    - e. Brass piston.
    - f. Trap primer distribution:
      - 1) Up to 4 traps.
      - 2) 2 IN copper body.
      - 3) Brass outlet.
- E. Cleanouts (CO):
  - 1. Cleanouts for cast iron pipe:
    - a. Tapped extra heavy cast iron ferrule.
    - b. Calked into cast iron fittings.
    - c. Extra heavy brass neoprene seal screw plug with solid hexagonal nut.
  - 2. Cleanouts for steel pipe: Extra heavy brass screw plug in drainage fittings.
  - 3. Access housing with adjustable anchor flange and secured scoriated cast: Wade W-3800-MF.
  - 4. Cleanouts turning out through walls and up through floor shall be made by long sweep ells or "y" and 1/8 bends with plugs and face or deck plates to conform to architectural finish in room.
    - a. Where definite finish is not indicated, wall plates shall be chrome-plated cast-brass and floor plates polished brass.
  - 5. Code:
    - a. Provide cleanouts of same size as pipe up to 4 IN and not less than 4 IN for larger pipes.
    - b. Close access openings for concealed cleanouts with flush floor or flush wall cover plates or flush ceiling access panels.
    - c. Provide wall plates with chrome plated cast-brass round cleanout cover with flanged ring.
    - d. Provide screws which match cover plate material.
  - 6. Cleanouts installed in floor with a resilient tile finish: Wade W-6000-TS.
  - 7. Cleanouts installed in floor with ceramic tile, concrete, or Terrazzo finish: Wade W-6000-U.
  - 8. Cleanouts installed in finished rooms flush with wall: Wade W-8480-S stainless steel.
  - 9. Cleanouts installed in completely accessible pipe chases or where piping is exposed do not require special covers.
  - 10. Cleanouts in floating floors: Wade 8300-MF housing and cover with 8550 cleanout body and closure plug or Smith 4250 or 4260 Series housing and cover with 4280 or 4290 Series cleanout body and closure plug.
- F. Hose Bibb (HB):
  - 1. 3/4 IN boiler drain with attached vacuum breaker-backflow preventer.
  - 2. Vacuum breaker: Non-removable, manual draining, meeting the requirements of the ASSE 1011.
- G. Hose Valve:
  - 1. Cast brass.
  - 2. Minimum pressure rating 150 PSI.
  - 3. Angle configuration.



4. Hose outlet connection 1-1/2 IN or 2-1/2 IN as shown on Drawings or scheduled.
5. Pin lug protective hose thread cap with chain.

H. Hose Reel (HR):

1. HR:
  - a. Capacity for 60 FT of 1/4 IN ID air hose.
  - b. Spring rewind with ratchet locking and hose stop.
  - c. Roller position VR.
  - d. 1/2 IN female IPT swivel joint inlet and 1/2 IN female IPT outlet.
  - e. Isolation valve at inlet.
  - f. Hannay Model SSN700.

## 2.3 FABRICATION

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Cross Connection: Do not install any plumbing components that will provide a cross connection between potable and non-potable or drainage systems.
- B. Fixtures:
  1. Install fixtures at locations indicated on Drawings and in compliance with local Codes.
  2. Connect plumbing supply, drain and vent line sizes as shown on Drawings.
  3. Set proper grounds to form secure base for each fixture and rigid setting.
  4. Install fixtures except water closets with water supply above rim and with Code approved backflow preventers.
  5. Seal fixture joints abutting walls and floors with silicone sealant.
  6. Connect exposed traps and supply pipes for fixtures and equipment to rough piping systems at wall, unless otherwise specified.
  7. Install emergency fixtures in accordance with ANSI Z358.1.
- C. Drains:
  1. Install drains at locations indicated on Drawings and in compliance with local Codes.
  2. In quarry tile floors:
    - a. 24 x 24 IN 6 LB lead sheet clamped to drain.
    - b. Set 1-1/2 IN above structural slab for mortar set and 1/2 IN for thin set.
  3. In uncovered concrete slabs:
    - a. Install at the low points of surface areas to be drained or as indicated.
    - b. Set tops of drains flush with the finished floor.
    - c. Install drain flashing collar or a flange so that no leakage occurs between the drain and the adjoining surfaces.
    - d. Maintain the integrity of waterproof membranes, where penetrated.
  4. Trench drains:
    - a. Install in accordance with manufacturer's instructions and approved Shop Drawings.
    - b. Install trench sections with the top edges level and straight at elevations indicated.
      - 1) Support channel sections in place while concrete is placed under and around sections as indicated.
- D. Hose Bibbs:
  1. Install 3/6 IN above finished floor.
  2. In exterior locations, provide interior isolation valve.
- E. Cleanouts:
  1. Install cleanouts:
    - a. Above floor in each vertical riser that connects to horizontal branch below floor.
    - b. At test tee to receive proper test plugs in each vertical riser at least every other floor.
    - c. As required by local Code.

F. Reduce Pressure Backflow Preventer: Install on water lines as required by Code.

**3.2 FIELD QUALITY CONTROL**

A. Test piping and fixtures for leaks.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.



## DIVISION 23

**HEATING, VENTILATING, AND AIR  
CONDITIONING (HVAC)**

THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 23 05 13**  
**COMMON MOTOR REQUIREMENTS FOR PLUMBING [AND HVAC] EQUIPMENT**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Equipment furnished for plumbing and HVAC systems.
  - 2. Single phase motors for plumbing and HVAC equipment.
  - 3. Three-phase motors for plumbing and HVAC equipment.
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Bearing Manufacturers Association (ABMA).
  - 2. International Electrotechnical Commission (IEC).
  - 3. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
  - 4. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. ICS 6, Enclosures for Industrial Control and System.
    - c. MG 1, Motors and Generators.
  - 5. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC):
  - 6. Occupational Safety and Health Administration (OSHA):
    - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
  - 7. Underwriters Laboratories, Inc. (UL):
    - a. 508A, Standard for Industrial Control Panels.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Equipment technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Data sheets that include manufacturer's name and complete product model number.
      - 1) Clearly identify all optional accessories that are included.
    - c. Equipment identification utilizing numbering system and name utilized in Drawings.
    - d. Equipment installation details:
      - 1) Location of anchorage.
      - 2) Type, size, and materials of construction of anchorage.
      - 3) Anchorage setting templates.
      - 4) Manufacturer's installation instructions.
    - e. Equipment physical characteristics:
      - 1) Dimensions (both horizontal and vertical).
      - 2) Materials of construction and construction details.
      - 3) Shipping and operating weight.
      - 4) Duct and piping connection sizes, type and location.
    - f. Equipment lining and coatings:
      - 1) Equipment factory primer and paint data.
    - g. Operating characteristics:

- 1) Utility requirements, natural gas, electric and other.
  - 2) Performance curves.
  - 3) Equipment capacity and efficiency.
  - h. Electric motors:
    - 1) Nameplate data.
    - 2) Performance data.
  - i. Control panels:
    - 1) Panel layout and construction.
    - 2) Control ladder diagrams.
    - 3) Nameplate schedule.
    - 4) Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
- B. Contract Closeout Information:
1. Operation and Maintenance Data:
    - a. See Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, refer to individual equipment Specification Sections for acceptable manufacturers.
- B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Motors:
    - a. Baldor.
    - b. General Electric.
    - c. Hyundai Heavy Industries.
    - d. Marathon Electric.
    - e. Rockwell - Reliance.
    - f. Siemens.
    - g. TECO-Westinghouse.
    - h. Toshiba U.S.
    - i. U.S. Motors, Nidec Motor Corporation.
    - j. WEG.

### **2.2 MANUFACTURED UNITS**

- A. Equipment: Refer to individual equipment Specification Sections for product requirements.
- B. Electric Motors:
1. Design for frequent starting duty equivalent to duty service required by driven equipment.
  2. Design for full voltage starting.
  3. Design bearing life based upon actual operating load conditions imposed by driven equipment.
  4. Size for altitude of Project.
  5. Furnish with stainless steel nameplates which include all data required by NFPA 70 (NEC), Article 430.
  6. Use of manufacturer's standard motor will be permitted on integrally constructed motor driven equipment specified by model number in which a redesign of the complete unit would be required in order to provide a motor with features specified.
  7. AC electric motors less than 1/3 HP:
    - a. Single phase, 60 Hz, designed for the supply voltage shown on the Drawings.
    - b. Permanently lubricated sealed bearings conforming to ABMA standards.
    - c. Built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element with stainless steel enclosure.

8. AC electric motors 1/3 to 1 HP:
  - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
  - b. Permanently lubricated sealed bearings conforming to ABMA standards.
    - 1) For single phase motors, provide built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element.
9. AC electric motors 1-1/2 to 10 HP:
  - a. 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
  - b. Permanently lubricated sealed bearings conforming to ABMA standards.
  - c. For vertical motors provide 15 year, average-life thrust bearings conforming to ABMA standards.
10. Severe duty motor to have the following minimum features:
  - a. All cast iron construction.
  - b. Gasketed conduit box.
  - c. Epoxy finish for corrosion protection.
  - d. Hydroscopic varnish on windings for corrosion protection.
  - e. Drain plug and breather.

## 2.3 ACCESSORIES

- A. Guards:
  1. Provide each piece of equipment having exposed moving parts with full length, easily removable guards, meeting OSHA requirements.
  2. Interior applications:
    - a. Construct from expanded galvanized steel rolled to conform to shaft or coupling surface.
    - b. Utilize non-flattened type 16 GA galvanized steel with nominal 1/2 IN spacing.
    - c. Connect to equipment frame with hot-dip galvanized bolts and wing nuts.
  3. Exterior applications:
    - a. Construct from 16 GA stainless steel or aluminum.
    - b. Construct to preclude entrance of rain, snow, or moisture.
    - c. Roll to conform to shaft or coupling surface.
    - d. Connect to equipment frame with stainless steel bolts and wing nuts.
- B. Data Plate:
  1. Attach a stainless steel data plate to each piece of rotary or reciprocating equipment.
  2. Permanently stamp information on data plate including manufacturer's name, equipment operating parameters, serial number and speed.
- C. Lifting Eye Bolts or Lugs:
  1. Provide on all equipment 50 LBS or greater.
  2. Provide on other equipment or products as specified in the narrow-scope Specification Sections.

## 2.4 FABRICATION

- A. Design, fabricate, and assemble equipment in accordance with modern engineering and shop practices.
- B. Manufacture individual parts to standard sizes and gages so that repair parts, furnished at any time, can be installed in field.
- C. Furnish like parts of duplicate units to be interchangeable.
- D. Ensure that equipment has not been in service at any time prior to delivery, except as required by tests.
- E. Furnish equipment which requires periodic internal inspection or adjustment with access panels which will not require disassembly of guards, dismantling of piping or equipment or similar major efforts.
  1. Quick opening but sound, securable access ports or windows shall be provided for inspection of chains, belts, or similar items.



- F. Provide common, lipped base plate mounting for equipment and equipment motor where said mounting is a manufacturer's standard option.
  - 1. Provide drain connection for 3/4 IN PVC tubing.
- G. Machine the mounting feet of rotating equipment.
- H. Fabricate equipment which will be subject to Corrosive Environment in such a way as to avoid back to back placement of surfaces that can not be properly prepared and painted.
  - 1. When such back to back fabrication can not be avoided, provide continuous welds to seal such surfaces from contact with corrosive environment.
  - 2. Where continuous welds are not practical, after painting seal the back to back surfaces from the environment in accordance with Section 07 92 00.
- I. Critical Speed:
  - 1. All rotating parts accurately machined and in as near perfect rotational balance as practicable.
  - 2. Excessive vibration is sufficient cause for equipment rejection.
  - 3. Ratio of all rotative speeds to critical speed of a unit or components: Greater than 1.2.
- J. Control Panels Engineered and Provided with the Equipment by the Manufacturer:
  - 1. Manufacturer's standard design for components and control logic unless specific requirements are specified in the specific equipment Specification Section.
  - 2. NEMA or IEC rated components are acceptable, whichever is used in the manufacturer's standard engineered design, unless specific requirements are required in the specific equipment Specification Section.
  - 3. Affix entire assembly with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to delivery.
    - a. Control panels without an affixed UL 508A or UL 698A label shall be rejected.
  - 4. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
    - a. Determine the SCCR rating by one of the following methods:
      - 1) Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
      - 2) Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
      - 3) Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
    - b. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the control panel circuit originates.
    - c. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

## 2.5 SHOP OR FACTORY PAINT FINISHES

- A. Electrical Equipment:
  - 1. Provide factory-applied paint coating system(s) for all electrical equipment components except those specified in Section 09 96 00 to receive field painting.
    - a. Field painted equipment: See Section 09 96 00 for factory applied primer/field paint compatibility requirements.
- B. Field paint other equipment in accordance with Section 09 96 00.
  - 1. See Section 09 96 00 for factory applied primer/field paint compatibility requirements.

## 2.6 SOURCE QUALITY CONTROL

- A. The Buyer reserves the right to select and have tested any motor included within the project.
  - 1. If motor passes testing requirements, the Buyer shall be responsible for any shipping and testing costs incurred.
  - 2. Costs shall be determined by current freight rates and manufacturer's published rates at the time of the test.

3. If motor fails test, Supplier shall be responsible for all costs incurred.
4. If two successive motors fail the test, the Buyer has the right to reject any or all motors from that manufacturer.
5. The Buyer also reserves the right to witness any routine or complete tests at the Buyer's expense.
6. Notify the Buyer a minimum of 14 days in advance of the testing.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install equipment as shown on Drawings and in accordance with manufacturer's directions.
- B. For equipment having drainage requirements such as condensate, provide 3/4 IN PVC or clear plastic tubing from equipment base to nearest floor or equipment drain.
  1. Route clear of major traffic areas and as approved by Engineer.
- C. Extend all non-accessible grease fittings using stainless steel tubing to a location which allows easy access of fittings from closest operating floor level.
- D. Couplings:
  1. Align in the annular and parallel positions.
    - a. For equipment rotating at 1200 RPM or less, align both annular and parallel within 0.001 IN tolerance for couplings 4 IN size and smaller.
      - 1) Couplings larger than 4 IN size: Increase tolerance 0.0005 IN per inches of coupling diameter, i.e., allow 6 IN coupling 0.002 IN tolerance, and allow a 10 IN coupling 0.004 IN tolerance.
    - b. For equipment rotating at speeds greater than 1200 RPM allow both annular and parallel positions within a tolerance rate of 0.00025 IN per inch coupling diameter.
  2. If equipment is delivered as a mounted unit from factory, verify factory alignment on site after installation and realigned if necessary.
  3. Check surfaces for runout before attempting to trim or align units.
- E. Grouting:
  1. After machine base has been shimmed, leveled onto equipment base, couplings aligned and mounting bolts tightened to correct torque value, place a dam or formwork around base to contain grouting between equipment base and equipment support pad.
    - a. Extend dam or formwork to cover leveling shims and blocks.
    - b. Do not use nuts below the machine base to level the unit.
  2. Saturate top of roughened concrete subbase with water before grouting.
    - a. Add grout until entire space under machine base is filled to the top of the base underside.
    - b. Puddle grout by working a stiff wire through the grout and vent holes to work grout in place and release any entrained air in the grout or base cavity.
  3. When the grout has sufficiently hardened, remove dam or formwork and finish the exposed grout surface to fine, smooth surface.
    - a. Cover exposed grout surfaces with wet burlap and keep covering sufficiently wet to prevent too rapid evaporation of water from the grout.
    - b. When the grout has fully hardened (after a minimum of seven (7) days) tighten all anchor bolts to engage equipment base to grout, shims, and equipment support pad.
    - c. Recheck driver-driven unit for proper alignment.

### **3.2 INSTALLATION CHECKS**

- A. For all equipment specifically required in detailed specifications, secure services of experienced, competent, and authorized representative(s) of equipment manufacturer to visit site of work and inspect, check, adjust and approve equipment installation.
  1. In each case, representative(s) shall be present during placement and start-up of equipment and as often as necessary to resolve any operational issues which may arise.

- B. Secure from equipment manufacturer's representative(s) a written report certifying that equipment:
  - 1. Has been properly installed and lubricated.
  - 2. Is in accurate alignment.
  - 3. Is free from any undue stress imposed by connecting piping or anchor bolts.
  - 4. Has been operated under full load conditions and that it operated satisfactorily.
    - a. Secure and deliver a field written report to Owner immediately prior to leaving jobsite.
- C. No separate payment shall be made for installation checks.
  - 1. All or any time expended during installation check does not qualify as Operation and Maintenance training or instruction time when specified.

### **3.3 IDENTIFICATION OF EQUIPMENT AND HAZARD WARNING SIGNS**

- A. Identify equipment and install hazard warning signs in accordance with Section 10 14 00.

### **3.4 FIELD HIGH PERFORMANCE INDUSTRIAL COATINGS**

- A. For required field High Performance Industrial Coatings, comply with Section 09 96 00.

### **3.5 WIRING CONNECTIONS AND TERMINATION**

- A. Clean wires before installing lugs and connectors.
- B. Coat connection with oxidation eliminating compound for aluminum wire.
- C. Terminate motor circuit conductors with copper lugs bolted to motor leads.
- D. Tape stripped ends of conductors and associated connectors with electrical tape.
  - 1. Wrapping thickness shall be 150 PCT of the conductor insulation thickness.
- E. Connections to carry full ampacity of conductors without temperature rise.
- F. Terminate spare conductors with electrical tape.

### **END OF SECTION**

**SECTION 23 05 48**  
**VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Vibration isolators.

**1.2 REFERENCE STANDARDS**

- A. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
  - 1. HVAC Duct Construction Standards - Metal and Flexible.

**1.3 PREINSTALLATION MEETINGS**

- A. Section 01 30 00 - Special Conditions: Requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal: Requirements for submittals.
- B. Product Data:
  - 1. Submit schedule of vibration isolator type with location and load on each.
  - 2. Submit manufacturer catalog information indicating materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

**1.5 CLOSEOUT SUBMITTALS**

- A. Division 01: Closeout Procedures
- B. Project Record Documents:
  - 1. Record actual locations of hangers including attachment points.

**1.6 QUALITY ASSURANCE**

- A. Perform Work according to AMCA 300 standards and ASHRAE 68 recommendations.

**1.7 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
  - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  - 2. Provide additional protection according to manufacturer instructions.

## 1.9 WARRANTY

- A. Division 01: Requirements for warranties.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Provide vibration isolation devices on motor-driven equipment over 0.25 HP, plus connected piping and ductwork.
- B. Maintain rooms at following maximum sound levels, according to Noise Criteria (NC) or Room Criteria (RC) Mark II as defined by ASHRAE Handbook - HVAC Applications and ANSI S1.8.
  - 1. Offices:
    - a. Private: 30.

### 2.2 VIBRATION ISOLATORS

- A. Manufacturers:
  - 1. Mason Industries, Inc.
  - 2. Ace Mounting Co, Inc.
  - 3. Amber/Booth Company, Inc.
  - 4. California Dynamics Corporation
  - 5. Isolation Technology, Inc.
  - 6. Kinetics Noise Control, Inc

Substitutions: As specified in Section 01 60 00 - Product Delivery, Storage, and Handling.

- B. Spring Hangers:
  - 1. Spring Isolators:
    - a. Exterior and Humid Areas: Furnish hot-dip galvanized housings and neoprene-coated springs.
    - b. Code: Color-code springs based on load carrying capacity.
  - 2. Springs:
    - a. Minimum Horizontal Stiffness: 75 PCT of vertical stiffness.
    - b. Working Deflection: Between 30 and 60 PCT of maximum deflection.
  - 3. Housings: Incorporate neoprene isolation pad as specified for neoprene pad isolators or rubber hanger with threaded insert.
  - 4. Misalignment: Capable of 20-degree hanger rod misalignment.
- C. Rubber Mount or Hanger:
  - 1. Material: Molded rubber.
  - 2. Deflection: 0.5 IN.
  - 3. Insert: Threaded.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that equipment, ductwork, and piping are installed before starting Work of this Section.

### 3.2 INSTALLATION

- A. Install isolation for motor-driven equipment.
- B. Make equipment level.
- C. Install spring hangers without binding.

### 3.3 FIELD QUALITY CONTROL

- A. Division 01: Requirements for inspecting and testing.

- B. Inspect isolated equipment after installation and submit report, including static deflections.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 23 05 53**  
**IDENTIFICATION FOR HVAC, DUCTWORK, PIPING AND HVAC EQUIPMENT**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Nameplates.
  - 2. Tags.
  - 3. Labels.
- B. Related Sections:
  - 1. Section 09 96 00 - High Performance Industrial Coatings..

**1.2 REFERENCES**

- A. American Society of Mechanical Engineers (ASME):
  - 1. A13.1, Scheme for the Identification of Piping Systems.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturers catalog literature for each product required.
- C. Shop Drawings: Submit Identification Register including list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

**1.4 QUALITY ASSURANCE**

- A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.
- B. Maintain one copy of each document on site.

**1.5 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**PART 2 - PRODUCTS****2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Nameplates and Tags:
    - a. WH Brady Company.
    - b. Panduit.
    - c. Seton.
    - d. National Band and Tag Company.
    - e. Carlton Industries, Inc.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

**2.2 NAMEPLATES**

- A. Laminated two-layer phenolic or DR (high impact) acrylic with engraved black letters on light contrasting background color.
  - 1. Thickness: Minimum 1/16 IN.



2. Color: Manufacturer standard or as specified.
- B. Alternate: Laminated three-layer plastic with engraved black letters on light contrasting background color.
  1. Thickness: Minimum 60 mils.
  2. Color: Manufacturer standard or as specified.

## **2.3 TAGS**

- A. Nonmetallic Tags:
  1. Fiberglass reinforced engraved black letters on light contrasting background color.
    - a. Tag size: Minimum 1-1/2 IN diameter.
    - b. Thickness: Minimum 100 mils.
    - c. Color: Manufacturer standard or as specified.
- B. Metal Tags:
  1. Aluminum or stainless steel disc with stamped letters and finished edges.
    - a. Tag size: Minimum 1-1/2 IN diameter.
    - b. Thickness: Minimum 0.035 IN (20 Ga).
    - c. Color: Black color filled into stamped text with natural metal background.
- C. Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame.

## **2.4 SELF ADHESIVE PIPE AND DUCT MARKERS**

- A. Color and Lettering: Conform to ASME A13.1.
- B. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
  1. Thickness: Minimum 5 mils.
  2. Letter Height:
    - a. Ductwork and Equipment: 1-3/4 IN high letters.
  3. Indoor/outdoor grade.
  4. Weather and UV resistant inks.
  5. Permanent adhesive.

# **PART 3 - EXECUTION**

## **3.1 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

## **3.2 INSTALLATION**

- A. Install identifying devices after completion of coverings and painting.
- B. All identification devices to be printed by mechanical process. Hand printing is not acceptable.
- C. Install nameplates with adhesive where equipment has sufficient surface area and texture.
  1. Attach tags with 1/8 IN flat head screws where adhesive application is not suitable.
  2. Attach tabs with plastic strap where screws should not or cannot penetrate substrate.
- D. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer.
- E. Tag single items of equipment enclosed in a housing or compartment on outside of housing.
  1. Tag multiple items mounted inside a housing or compartment individually inside the housing.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify ductwork with nameplates. Identify service and direction. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction and change of direction and not to exceed 20 FT spacing on straight runs.

### 3.3 SCHEDULES

- A. Ductwork:
  - 1. Install labels on all duct in accordance with Article 3.2.
    - a. Self-adhesive labels.
  - 2. Color Coding:
    - a. Black lettering on yellow back ground:
      - 1) Supply Air, Outside Air or Makeup Air.
    - b. White lettering on green background:
      - 1) Return Air, Exhaust Air and Relief Air.
- B. Equipment:
  - 1. Provide nameplate as warranted per Article 3.2.
  - 2. Label with equipment tag as shown on the Drawings.
    - a. Black lettering on white background.
  - 3. Provide OSHA warning sign for equipment that starts automatically.
  - 4. Label all equipment control panels located remote from unit.
  - 5. Label all thermostats with self-adhesive markers with tag of equipment served.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 23 05 93**

### **HVAC SYSTEMS - BALANCING AND TESTING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Adjusting, balancing, and testing of all heating, ventilating and air conditioning (HVAC) systems, including the following systems:
    - a. Air distribution and exhaust systems.
    - b. Air moving equipment.
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 23 09 00 - Instrumentation and Control for HVAC Systems.
  - 4. Section 23 31 00 - HVAC - Ductwork.
  - 5. Section 23 80 00 - HVAC - Equipment.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Associated Air Balance Council (AABC):
    - a. National Standards for Total System Balance.
  - 2. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
    - a. HVAC Applications Handbook, Chapter entitled "Laboratories".
    - b. HVAC Systems and Equipment Handbook, Chapter entitled "Testing, Adjusting, and Balancing".
  - 3. National Environmental Balancing Bureau (NEBB):
    - a. Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
- B. Qualifications:
  - 1. Work of this Section to be accomplished by an independent testing and balancing firm certified by one (1) of the following:
    - a. Associated Air Balance Council (AABC).
    - b. National Environmental Balancing Bureau (NEBB).
    - c. Other certification entity approved by Engineer.
  - 2. The independent firm shall not be the same firm as the firm installing the HVAC equipment, nor under contract to the firm installing the equipment.

##### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Certifications:
    - a. Letter stating the name and qualifications of the firm proposed.
    - b. Evidence that relevant subcontractors have been notified of the requirement to coordinate balance and test elements in the work with the testing and balancing firm.
  - 3. Report forms:
    - a. Procedures and forms to be used in calibrating of test instruments, balancing systems, and recording and reporting test data.
- B. Informational Submittals:
  - 1. Completed test reports and data forms upon completion of installation, balance and testing of HVAC systems.

- a. Insert recorded information on report forms required by specifications and approved for use on project.
- b. Additional written verification and other related information clearly identifying project, date and specifics of verification.
- c. Utilize report forms similar to those shown in Section V of AABC Standard.
- d. Provide forms typed and signed by the testing and balancing firm.

## **PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)**

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Secure approved Shop Drawings of all HVAC equipment.
- B. Procedures and Forms:
  1. Submit procedures and forms to be used in calibration of test instruments, balancing systems, and recording and reporting test data.
  2. Obtain approval before beginning balancing and testing.
- C. Do not begin balancing and testing until HVAC systems are complete and in full working order.
  1. Place HVAC systems into full operation and continue their operation during each working day of balancing and testing.
- D. Provide qualified heating and ventilating Engineer(s) to supervise and perform balancing and testing.
- E. Review design Drawings, specifications, approved Shop Drawings and other related items to become thoroughly acquainted with the design of HVAC systems.
- F. Check all installed systems against Contract Drawings, Specifications and Shop Drawings to see that system is installed as required.
  1. Report deficiencies to the Engineer.
  2. Report deficiencies to Contractor for remedial action including providing corrective measures required in the function of any part of system to complete balancing.
- G. Make necessary adjustments as required to balance the systems.

### **3.2 FIELD QUALITY CONTROL**

- A. Balance and Test Air Systems:
  1. Adjust equipment RPM to design requirements.
  2. Report motor full load amperes.
  3. Obtain design CFM at fans.
    - a. Make pitot tube traverse of main supply and exhaust ducts within 5 PCT.
  4. Test and record system static pressures, suction and discharge.
  5. Obtain design CFM for recirculated air.
  6. Obtain design CFM outside air.
  7. Test and record entering air temperatures, (DB, heating and cooling).
  8. Test and record leaving air temperatures, (DB, heating and cooling).
  9. Test and record leaving air temperatures, (WB, cooling).
  10. Adjust dampers in supply, exhaust and return air ducts to design CFM.
  11. Test diffusers, grilles, and registers as follows:
    - a. Adjust to comply with design requirements within 10 PCT.
    - b. Identify location and area of each.
    - c. Adjust face velocity to establish required CFM.
      - 1) Retest after initial adjustments.
    - d. Adjust to minimize drafts and to ensure uniform air distribution in all areas.

12. Identify and list size, type and manufacturer of diffusers, grilles, registers, and HVAC equipment.
  - a. Use manufacturer's ratings on equipment to make required calculations.
13. Adjust and assure that the operation of automatically operated dampers are as specified.
  - a. Check and calibrate controls.
14. Prepare and submit reports.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

**SECTION 23 09 00**  
**INSTRUMENTATION AND CONTROL FOR HVAC SYSTEMS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Instrumentation and control for HVAC systems.
  - 2. Temperature control.
  - 3. Ventilation control.
  - 4. Heating control.
  - 5. Cooling control.
  - 6. Control wiring.
  - 7. Panels and accessories.
  - 8. Miscellaneous.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 23 05 13 - Common Motor Requirements for Plumbing and HVAC Equipment.
  - 4. Section 23 31 00 - HVAC - Ductwork.
  - 5. Section 23 80 00 - HVAC - Equipment.
  - 6. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
  - 7. Section 26 05 33 - Raceways and Boxes.

**1.2 QUALITY ASSURANCE**

- A. See Specification Section 01 61 03.
- B. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. D1693, Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
  - 2. The International Society of Automation (ISA):
    - a. S5.1, Instrumentation Symbols and Identification.
    - b. S5.4, Standard Instrument Loop Diagrams.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 4. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 5. Underwriters Laboratories, Inc. (UL).
- C. Miscellaneous:
  - 1. Controls to be in compliance with Specification Section 26 05 00 for NEMA and NFPA 70 enclosure class requirements unless noted or specified otherwise.
  - 2. Unless specifically noted otherwise, components of systems shall be industrial duty suitable for moist, corrosive environments.

**1.3 SYSTEM DESCRIPTION**

- A. Work shall be provided as an integrated operating system.
- B. Provide a complete system of automatic temperature control, thermostats, relays, valves, damper operators and other associated controls and appurtenances required to maintain minimum conditions described in detail herein and on Drawings, together with thermometers, gages and other accessory equipment.
  - 1. Assemble control system with complete system of wiring to fulfill requirements of the Contract Documents.



- C. Install system using competent mechanics under direct supervision of control manufacturer.
- D. Controls, as set out in "Sequence of Operation," are designed to illustrate operating functions only.
  - 1. Control sequence shall be considered supplementary to "Sequence of Operation".
  - 2. These minimum specified items, and any additional controls, not indicated but required to meet performance as outlined in the Contract Documents, shall be furnished and installed at no additional cost to Owner to make a complete system.
- E. Sequence of Operation - General:
  - 1. Sequence of operation indicated illustrates basic operating functions only.
  - 2. Review Drawings and submit complete installation data, including minor details, to provide proper operation in his proposal.
  - 3. Where an item differs from specifications, control manufacturer shall submit manufacturer's recommendations subject to Engineer's approval.
  - 4. Garage
    - a. Ventilation
      - 1) Garage to be ventilated by supply fan SF-1 and exhaust fan EF-1.
      - 2) Fans to be pre-balanced to two operating flows:
        - a) Maximum CFM:
          - (1) SF-1: 4,000 cfm
          - (2) EF-1: 4,300 cfm
        - b) Minimum CFM:
          - (1) SF-1: 1,200 cfm
          - (2) EF-1: 1,500 cfm
      - 3) Operation:
        - a) General
          - (1) Both fans will be turned on via schedule, switch, CO (Carbon Monoxide) or NOX (Nitrogen Oxide) activation.
          - (2) Fans to operate minimum of 10 minutes (adj) once activated due to CO or NOX.
        - b) Operating Modes:
          - (1) Switch - when wall switch is activated fan shall operate for 2 hours (var) at maximum cfm.
          - (2) CO - when CO level is above 30 ppm (adj) fans shall operate at maximum cfm.
          - (3) NOX - when NOX level is above 0.8 ppm (adj) fan shall operate at maximum cfm.
          - (4) Schedule - during building schedule fan shall operate at minimum cfm.
        - c) Alarms:
          - (1) CO - when CO level is above 50 ppm (adj) alarm shall be activated.
          - (2) NOX - when NOX level is above 1 ppm (adj) alarm shall be activated.
        - d) Information Terminal:
          - (1) Alarms
          - (2) Supply fan on/off status (by current sensing relay).
          - (3) Exhaust fan on/off status (by current sensing relay).
          - (4) Supply fan failure (no current when commended ON)
          - (5) Exhaust fan failure (no current when commended ON)
          - (6) CO level
          - (7) NOX level
          - (8) Both fans speed setpoints
          - (9) Supply fan speed
          - (10) Exhaust fan speed
    - b. Air Circulation
      - 1) Air circulation will be forced by ceiling fan CF-1.
      - 2) Fans will be running at constant speed
      - 3) Operation:

- a) General
    - (1) Fan will be turned on via schedule or switch.
  - b) Operating Modes:
    - (1) Switch - when wall switch is activated fan shall operate for 2 hours.
    - (2) Schedule - during building schedule fan shall operate continuously.
  - c) Information Terminal:
    - (1) Fan on/off status (by current sensing relay).
    - (2) Fan failure (no current when commanded ON)
5. Office Space
- a. Office to be cooled, heated and ventilated by air handling unit AHU-1 and heat pump HP-1
    - 1) Circuited from control panel.
    - 2) Controlled by wall mounted programmable thermostat:
      - a) AHU gets energized based on programmed schedule and manual override:
      - b) Fan runs continuously and compressor cycles to maintain temperature setpoints (both heating and cooling)

## 1.4 SUBMITTALS

- A. Shop Drawings:
- 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Wiring diagrams showing point to point termination with auxiliary interlocks for each item in each control loop.
  - 3. Information on equipment proposed for use including corrosion protection.
  - 4. Instrument loop diagrams and word description of loop function for each individual unit controlled including auxiliary interlocks in full compliance with ISA S5.4.
    - a. Show components in system and ensure diagrams are in full compliance with ISA S5.1 (Instrumentation Symbols and Identification) and other related ISA standards.
- B. Quality Control Submittals:
- 1. Secure from equipment manufacturers, detailed and complete control and power wiring diagrams, word descriptions of controls provided as part of the HVAC equipment or equipment interfaced or interlocked thereto, and submit with equipment manufacturer's submittals.
    - a. Provide the above information to control manufacturer.
- C. Contract Closeout Information:
- 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

## 1.5 PROJECT CONDITIONS

- A. Unless stated otherwise, the environment and air streams will include varying concentrations of the following chemical components:
- 1. Carbon Monoxide .
  - 2. Nitrogen Oxide .

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
- 1. Manufacturer's catalog numbers hereinafter are for reference to type, style, dimension, related items and to establish a standard of quality.
    - a. Reference to a manufacturer's number hereinafter does not imply full compliance to these Specifications.

2. Instrumentation and control systems:
  - a. Honeywell.
  - b. Johnson Control Co.

B. Submit request for substitution in accordance with Specification Section 01 25 13.

## 2.2 EQUIPMENT

### A. Electric Control Instruments:

1. Provide stainless steel sensing elements type thermostats with liquid filled, compensated thermal systems so that equally spaced dial graduations are possible over entire range.
  - a. Make thermal systems field detachable with averaging or plain bulbs as installation conditions dictate.
  - b. Provide sensing elements minimum of 60 IN in length and suitable for operation from - 30 to 300 DEGF.
  - c. Provide reverse acting on-off type thermostats for controlling ventilating fans.
  - d. Provide multiple stage thermostats where designated in Paragraph "Sequence of Operation".
2. Provide transformers for supplying current to control equipment operating at less than 120 V and where required by manufacturer's automatic control system design capable of supplying 125 PCT of energy requirements of equipment connected for not less than 1 HR.
  - a. Enclose transformers in UL listed cabinets with conduit connections.
  - b. Provide fused disconnect switches on both primary and secondary sides.
3. Provide low limit electric thermostats of two-position type with 20 FT bulb and manual reset.
  - a. Shall be capable of opening thermostat circuit if any 1 FT section of bulb is subjected to a temperature below thermostat setting.
  - b. Each thermostat shall have two circuits, one to shut down fan, another for alarm.
  - c. Install all freeze-stats to override starter circuits regardless of position.
  - d. For corrosive environments provide thermostats with stainless steel sensing elements.
    - 1) Ensure element is installed to sense coldest point should stratification occur.
4. Provide each thermostat with an accurate red-reading thermometer sensing temperature outside of enclosure.
5. Label thermostat with identification tag of HVAC equipment controlled using phenolic nameplate in accordance with Specification Section 10 14 00.

### B. Temperature Control Panel (TCP):

1. Panel shall be wall-mounted and be sized to accommodate electrical switches, protective devices (except electrical switches and devices furnished as an integral part of air handling unit).
2. Mount indicating controllers or receiver-controllers, three-way air valves, relay, EP and PE switches, switching relays, ammeters and other accessory items on local sub-panels set in vicinity of equipment to be served.
  - a. Where two similar items of equipment, such as pumps, are installed adjacent to each other a single panel may be used to contain all instruments.
3. Fully compensated capillaries connected to instruments shall be of sufficient length to allow them to be run between equipment and placed in such a position so that they will not obstruct service of equipment or become damaged.
4. Manufacture panels in one of the following manners:
  - a. NEMA electrical panel boxes with windows.
  - b. Install gages flush mounted in swing out panel behind window with instruments and other control items located inside enclosures behind panel.
    - 1) Refer to Paragraph "Corrosion Protection."
5. Points to be monitored:
  - a. HAND/OFF/AUTO switches.
  - b. Indicator Lights:
    - 1) Supply Fan Status.
    - 2) Exhaust Fan Status.
    - 3) High level of Carbon Monoxide.

## 4) High level of Nitrogen Oxides.

## C. Carbon Monoxide level:

1. Carbon Monoxide detector contact: Detector, wiring, conduits and connection to temperature control panel to be provided and installed by mechanical contractor.

## D. Nitrogen Oxide level:

1. Nitrogen Oxide detector contact: Detector, wiring, conduits and connection to temperature control panel to be provided and installed by mechanical contractor.
  - a.

**2.3 FABRICATION**

## A. Corrosion Protection:

1. Protect metal parts of controls, instrumentation and related items from corrosive atmosphere by either protective coatings or select materials.
  - a. Aluminum and stainless steel require no further protection.
2. Provide NEMA 4X fiberglass control enclosures with tempered glass windows and vapor tight gaskets, illustrated in Hoffman Bulletin A-50, for protection of controls from corrosive environment.
  - a. Install control instruments inside enclosure and extend remote stainless steel sensing elements through enclosure wall.
  - b. Provide vaportight seals for penetrations of enclosure.
3. Provide in each enclosure industrial corrosion inhibitors, Hoffman Corrosion Inhibitors, as illustrated in Hoffman's technical Bulletin HCI.
4. Protect metal accessory items such as mounting brackets and fasteners not stainless steel, fiberglass or aluminum by epoxy or phenolic coatings.
5. Protect electric motor operator with corrosion inhibitors inside enclosure.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Comply with requirements of Specification Section 26 05 19 and Specification Section 26 05 33.
- B. Identification: See Specification Section 10 14 00.
- C. Connect control devices to perform functions indicated and perform in required sequence.
- D. Use remote element temperature transmitters for points of temperature transmitters for points of temperature measurement occurring in air ducts or shafts, or in mechanical piping system.
- E. Use remote element pressure transmitters of panel-mounted pressure gages.
- F. In general, locate thermostats for room control immediately inside door, above light switch, unless shown otherwise.
  1. Where light switch is in an entryway to room, locate thermostat on wall within room so it is capable of sensing true space conditions.
  2. Prior to installation, coordinate thermostat location with Engineer.
- G. Mount local control panels as shown on the drawing.
- H. Locate panels so visual observation and adjustment can be accomplished from floor level.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 23 31 00 HVAC - DUCTWORK**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. HVAC ductwork and accessories.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 08 90 00 - Louvers and Vents.
  - 4. Section 01 61 03 - Equipment - Basic Requirements.
  - 5. Section 23 05 13 - Common Motor Requirements for Plumbing and HVAC Equipment.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
    - a. 52, Method of Testing Air Conditioning Devices Used in General Ventilation for Removing Particulate Matter.
  - 2. National Fire Protection Association (NFPA).
  - 3. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
    - a. HVAC Duct Construction Standards - Metal and Flexible.
  - 4. Underwriters Laboratory, Inc. (UL):
    - a. Building Materials Directory.
  - 5. Building code:
    - a. International Code Council (ICC):
      - 1) International Building Code and associated standards, 2015 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
  - 1. Fabricator: Firms regularly engaged in the manufacture of the specific product, of type, size required, whose products have been in use in similar service for not less than three years.
  - 2. Installers: Firm with at least five years installation experience on products similar to that required for this Project.

#### **1.3 DEFINITIONS**

- A. Installer or Applicator:
  - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  - 2. Installer and applicator are synonymous.

#### **1.4 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Efficiency ratings per ASHRAE 52 for factory built and assembled filter units.
  - 3. Scaled ductwork drawings (1/4 IN equals 1 FT) showing duct and accessory layout and support.
- B. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

## C. Miscellaneous Submittal:

1. Documentation of qualifications for fabricators and installers.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

## A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Flexible duct connections:
  - a. Vent Fabrics.
  - b. Duro Dyne.
2. Backdraft dampers:
  - a. Air Balance.
  - b. Ruskin.
  - c. American Warming.
3. Ceiling diffusers:
  - a. Anemostat.
  - b. Carnes.
  - c. Titus.
  - d. Price.
4. Grilles and registers:
  - a. Anemostat.
  - b. Carnes.
  - c. Titus.
  - d. Price.
5. Manual (volume) dampers:
  - a. Air Balance.
  - b. Ruskin.
  - c. American Warming.
6. Duct sealers:
  - a. Durkee-Atwood.
  - b. Unitec McGill.
  - c. Benjamin Foster.
  - d. Design Polymerics.
7. Louvers:
  - a. Greenheck
  - b. Ruskin.
  - c. Air Balance.
  - d. American Warming.

**2.2 COMPONENTS**

## A. Duct and Fittings (Metallic):

1. Materials:
  - a. G90 galvanized steel:
    - 1) Comply with ASTM A653 and ASTM A90.
2. Fabrication (galvanized steel):
  - a. Minimum Sheet Metal Thickness:
    - 1) Per SMACNA for 2 IN WC pressure class.
      - a) Heavier gage sheet material may be used with associated reinforcement as an alternate to minimum thickness specified.
      - b) Lighter gage sheet material with associated reinforcement shall not be used as an alternate to minimum thickness specified.
  - b. Longitudinal Seams:
    - 1) Pittsburgh lock seam.
    - 2) Continuously Welded.

- c. Transverse Seams:
    - 1) SMACNA T-22 or T-24 companion flange.
    - 2) Factory fabricated flanged duct connection system:
      - a) Ductmate 25/35.
      - b) Angles and Cleates: Galvanized.
      - c) Snap cleats: Galvanized.
      - d) Gaskets: Close cell neoprene.
      - e) Bolts and screws: Stainless.
  - d. Sealing:
    - 1) Per SMACNA for Seal Class A.
- B. Supports and Hangers:
- 1. Materials (for galvanized duct):
    - a. Support angles: Galvanized or stainless steel, minimum 1-1/2 by 1-1/2 by 1/4 angle.
    - b. Hanger rods: Galvanized or Stainless steel.
    - c. Anchors: Stainless steel wedge type.
  - 2. Fabrication: Trapeze type units.
  - 3. Strap hangers are not allowed.
- C. Flexible Connections:
- 1. Materials: Hypalon, double coated closely woven glass fabric.
  - 2. Fabrication: Withstand 4.5 IN water column, positive and negative pressure.
- D. Flexible Duct:
- 1. Material: Continuous steel supporting spiral covered with 100 PCT continuous filament fiberglass with nonporous fiberglass/vinyl liner and reinforced Mylar/neoprene outer cover.
  - 2. UL listed, Class 1 with flame spread of 25 or less and smoke development rating not to exceed 50.
- E. Drain Pan:
- 1. Materials: Aluminum.
  - 2. Fabrication: 0.080 IN.
- F. Diffusers:
- 1. Materials:
    - a. Body: Extruded aluminum.
    - b. Ceiling diffuser gaskets: Sponge rubber.
  - 2. Fabrication:
    - a. Type: Square or rectangular with removable core.
    - b. Key operated opposed blade damper mounted in neck except where indicated on Drawings to be omitted.
      - 1) Dampers to be housed in round to square adapters.
    - c. Linear supply diffusers:
      - 1) Internal pattern control vanes which also function as volume control dampers, adjustable through slots.
      - 2) Mounting: Hanger inside ductwork.
      - 3) Length: As indicated on Drawings.
      - 4) Number of slots, size, location, and throw: See Drawings.
    - d. Finish:
      - 1) Circular diffusers: Clear satin anodized.
      - 2) Interior of perforated supply and return diffusers: Flat black paint.
- G. Volume Dampers and Flow Equalizers for Round Neck Diffusers:
- 1. Material: Aluminum.
  - 2. Fabrication:
    - a. Design for neck velocity: 2500 FT/MIN.
    - b. Center rod operator accessible through diffuser without removing diffuser.
    - c. Furnish with screws, duct collars, transitions and air pattern deflectors as required.



- H. Air Grille and Register Assembly:
  - 1. Materials:
    - a. Assembly: Extruded aluminum.
    - b. Gaskets: Sponge rubber.
  - 2. Fabrication:
    - a. Supply registers: Two sets individually adjustable louvers.
    - b. Exhaust and return registers: 45 DEG deflection front blades.
    - c. Dampers: Key-operated opposed blade.
    - d. Screws, duct collars, and transitions as required.
    - e. Finish:
      - 1) Manufacturer's standard factory applied finish.
      - 2) Color: White.
- I. Duct sealer:
  - 1. NFPA rating of "Non-Combustible".
  - 2. Flame spread rating: 25 or lower, in dry condition.
  - 3. Smoke developed rating: 50 or lower, in dry condition.
  - 4. Resistant to water and water vapors.
  - 5. Comply with UL 181.
  - 6. Pressure rupture rating: 16 IN WG, minimum.

## 2.3 MAINTENANCE MATERIALS

- A. Extra Materials:
  - 1. Furnish Owner with the following extra materials:
    - a. 2 complete filter media changes for each filter unit.
    - b. Filter media used during construction is in addition to this requirement.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Metal Ductwork:
  - 1. Install with longitudinal seams sealed for zero leakage.
    - a. For welded seams, submit sample for approval by Engineer.
  - 2. Install gaskets at each transverse joint and fasten sections together with bolts.
    - a. Tighten for zero leakage.
  - 3. Install supports and hangers with anchors in accordance with SMACNA HVAC Duct Construction Standards.
  - 4. Install flexible connections at fans:
    - a. Locate as close as possible to fan.
    - b. Allow 1 IN of slack to prevent vibration transmission.
    - c. Install thrust restraints across connectors.
- B. Dampers:
  - 1. Install where indicated on Drawings of sizes shown.
- C. Diffusers:
  - 1. Install where shown on Drawings of size and capacities scheduled on Drawings.
  - 2. Install painted lay-in type in lay-in ceilings.
  - 3. Install prime painted diffusers in areas where duct work is concealed.
  - 4. Install anodized diffusers in exposed duct work.
- D. Air Grille and Register Assemblies:
  - 1. Install where shown on Drawings of size and capacities scheduled on Drawings.
  - 2. Install prime painted grilles and registers in areas where duct work is concealed.
    - a. Field paint to match adjacent surface finish.
- E. Louvers:

1. Install in accordance with manufacturer's instructions.
  - a. Provide anchoring and bracing accessories as required.
  - b. Seal around perimeter on exterior and interior.
  - c. Provide aluminum flashing at sill to match louver.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 23 34 00**

### **HVAC - FANS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Heating, ventilating, and cooling equipment.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 23 05 13 - Common Motor Requirements for Plumbing and HVAC Equipment.
  - 4. Section 23 05 93 - HVAC Systems - Balancing and Testing.
  - 5. Section 23 09 00 - Instrumentation and Control for HVAC Systems.
  - 6. Section 23 31 00 - HVAC - Ductwork.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Air Movement and Control Association (AMCA).
    - a. AMCA Publication 203 "Field Performance Measurement of Fan Systems"
    - b. ANSI/AMCA 210 "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating".
  - 2. Air Conditioning and Refrigeration Institute (ARI).
  - 3. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
    - a. HVAC Applications Handbook, Chapter entitled "Sound and Vibration Control."
    - b. 20, Methods of Testing for Rating Remote Mechanical-Draft Air-Cooled Refrigerant Condensers.
    - c. 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
  - 4. Canadian Standards Association (CSA).
  - 5. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 6. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 7. Underwriters Laboratories, Inc. (UL):
    - a. 507, Standard for Electric Fans.
  - 8. Building code:
    - a. International Code Council (ICC):
      - 1) International Building Code and associated standards, 2015 Edition including all amendments, referred to herein as Building Code.
- B. Miscellaneous:
  - 1. Gage thickness specified herein shall be manufacturer's standard gage for steel and Brown and Sharpe gage for non-ferrous metals.
  - 2. Corrosion protection of equipment to be as specified herein.

##### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Wiring diagrams.

- d. Control diagrams.
  - e. Manufacturer's catalog cuts and technical data.
  - f. Corrosion-protection information.
  - g. Fan curves.
  - h. Sound data.
  - i. Vibration isolation.
  - j. Performance data on all equipment.
- 3. Certifications:
  - a. Provide certification of thickness of corrosion-protection coating.
  - b. Fan systems have been tested in accordance with AMCA Standard 210 or 260, and are licensed to bear the AMCA Certified Ratings Seal.
- B. Factory Performance test for any fan having a flow rate greater than 1,000 CFM and/or a total static pressure rating equal to or greater than 1.5 IN WC.
  - 1. Pursuant to AMCA Publication 203 or 210 with no plus tolerances on Power and no minus tolerances on flow or pressure.
- C. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Vibration isolation assemblies:
    - a. Mason.
    - b. Vibration Mounting and Controls Co.
    - c. Vibro-Acoustics.
  - 2. Corrosion-protective coatings:
    - a. Heresite and Chemical Co.; "Heresite."
    - b. Aero-Marine Engineering, Inc.
  - 3. In-line centrifugal fans:
    - a. Grenheck
    - b. New York Blower.
    - c. Twin City
    - d. Loren Cook Co.
    - e. Aerovent.
  - 4. Industrial Ceiling fans:
    - a. Leading Edge.
    - b. Big Ass Solutions.
    - c. Greenheck.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

### **2.2 GENERAL**

- A. All Manufactured Units:
  - 1. Comply with Specification Section 23 05 13.
  - 2. Factory wired and assembled.
  - 3. Use fasteners made of same material as unit.
  - 4. Fabricate motor assemblies and unit housings with vibration isolation assemblies:
    - a. Type: As per Table 47, Chapter 48, ASHRAE HVAC Applications Handbook.
- B. All manufactured units shall be constructed with corrosion-resistant materials or have corrosion-resistant coating.

1. Type:
  - a. Corrosion-resistant materials:
    - 1) Aluminum.
    - 2) Stainless steel.
    - 3) FRP.
  - b. Corrosion-resistant coating:
    - 1) Phenolic-based coating Epoxy-based coating.
    - 2) 3 MIL minimum dry thickness, air-dried coating, for surfaces exposed to temperatures less than 150 DEGF.
    - 3) 5 MIL baked-on coating for heat transfer surfaces and surfaces exposed to temperatures greater than 150 DEGF.
    - 4) Factory applied.
    - 5) Provide factory certification of application.

## 2.3 MANUFACTURED UNITS

- A. In-Line Centrifugal Fans:
  1. AMCA certified Class I, II, or III.
  2. Non-overloading horsepower capability.
  3. Materials:
    - a. Wheel, impeller hub and blades: Aluminum or stainless steel.
    - b. Housing, innertube and belt well: Aluminum or stainless steel.
    - c. Inlet cone: Aluminum or stainless steel.
    - d. Driver shaft: Solid stainless steel.
  4. Airfoil design blades.
    - a. All welded construction.
  5. All welded housing, innertube and belt well.
  6. Innertube construction:
    - a. Isolates bearings and drive from airstream.
    - b. Removable end covers.
  7. Bearings:
    - a. Cast iron pillow blocks.
    - b. Concentric bearing locking collar for drive shafts 1 IN and larger.
      - 1) SKF "ConCentra."
      - 2) Dodge "D Lock."
    - c. Regreaseable.
    - d. 200,000 HR average life.
  8. Motor:
    - a. See Specification Section 23 05 13.
    - b. Direct Drive Units:
      - 1) Keyed hub type.
    - c. Adjustable motor base.
  9. Flanged inlet and outlet.
  10. Accessories:
    - a. Weatherproof, louvered motor enclosure for exterior installation.
    - b. Internal inlet damper with external control linkage.
    - c. Stack hood.
    - d. Cam type access door.
    - e. Ceramic felt shaft seal.
    - f. Extended grease links and fittings.
  11. Size and capacity as scheduled on Drawings.
- B. Industrial Ceiling Fan:
  1. UL listed.
  2. AMCA certified.
  3. Materials: Sprayproof and corrosion resistant.
    - a. Upper and lower canopy: Plastic.

- b. Motor and blades: Electrostatically applied epoxy paint.
  - c. Down rod canopy seal: Neoprene.
  - d. Lower boot deflector: Neoprene.
  - e. Outer motor ring seal: Neoprene.
- 4. Blades:
  - a. Straight with contoured shape.
  - b. Rolled edges.
  - c. Weight balanced.
- 5. Bearing:
  - a. Neoprene sealed ball bearings, upper and lower.
- 6. Motor:
  - a. See Specification Section 23 05 13.
  - b. UL 507, waterproof tested.
  - c. Internal thermal overload protection.
  - d. Totally enclosed.
  - e. Direct drive.
  - f. Split capacitor type.
  - g. Varnish dipped.
- 7. Secondary cable support assembly.
- 8. Accessories:
  - a. Solid state motor speed controller.
  - b. Fan guard.
  - c. 36 IN downrod.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install in accordance with Specification Section 23 05 13.
- B. Install fixed pitched drive sheave after sheave has been sized based on accepted test and balance report.
- C. Do not operate fans for any purpose until ductwork is clean, filters are in place, bearings lubricated and fan has been test run under observation.

### **3.2 FIELD QUALITY CONTROL**

- A. Comply with Specification Section 23 05 93.

### **3.3 ADJUSTING**

- A. Install new filters on units which have been running prior to acceptance of Project.

## **END OF SECTION**

## **SECTION 23 74 36**

### **REFRIGERANT PIPING SYSTEM**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Refrigeration piping system.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 23 80 00 - HVAC - Equipment.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
    - a. 15, Safety Code for Mechanical Refrigeration.
  - 2. ASTM International (ASTM):
    - a. B280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
  - 3. Federal Specification (FS):
    - a. WW-T-799, Tube, Copper, Seamless, Water (For Use With Solder-Flared or Compression-Type Fittings).

##### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
  - 3. Test reports:
    - a. A dated declaration of the test of the refrigerant piping for each system shall be provided.
      - 1) The dated declaration shall include the information outlined in Article 12.3 of ASHRAE 15.
    - b. Test reports of the refrigerant piping leak tests for all refrigerant piping systems installed.
    - c. The test reports shall contain the following information:
      - 1) System refrigerant and high and low side pressure used.
      - 2) Listing of the necessary repairs made before the refrigerant piping system passed the leak test.
      - 3) Identification of specific system by referencing specific equipment identification numbers.
      - 4) Leak testing media used.
      - 5) Suction and discharge refrigerant gas pressures and temperatures taken after the refrigerant system has been charged.
- B. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.



## 1.4 WARRANTY

- A. The completed refrigerant piping system shall be guaranteed to be sufficiently free from leaks so that the loss of refrigerant for 18 months from the date of final payment shall not exceed 5 percent.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Refrigerant piping specialties:
    - a. Sporlan.
  - 2. Expansion valves:
    - a. Sporlan.
    - b. Alcoa.
  - 3. Silver solder - "Easy-Flow 45 IN":
    - a. Harman.
  - 4. Moisture indicator - "SEE-ALL":
    - a. Sporlan.

### 2.2 REFRIGERANT PIPING AND FITTINGS

- A. Refrigerant Piping:
  - 1. Copper tubing conforming to ASTM B280 and/or FS WW-T-799, dehydrated for refrigerant use, with high-temperature soldered joints and wrought copper (400 PSIG) fittings.
    - a. For aboveground use: Type L.
- B. Piping Joints:
  - 1. Joints between copper tubing and fittings to be high temperature soldered (melting point not less than 1000 DEGF, but less than that of the metal being joined) with phos-copper alloys.
  - 2. Joints between copper and brass, steel, etc., shall be silver soldered only.
    - a. Silver solder to be Handy Harmon "Easy-Flow 45."
- C. Precharged Line Sets: Size per manufacturer's recommendations.
- D. Field Assembled Units:
  - 1. Size refrigeration lines according to manufacturer's published tables using pressure or temperature drops as follows:
    - a. Suction lines: 2 DEGF.
    - b. Liquid lines: 1 DEGF or 2 PSI.
    - c. Hot gas lines: 1 DEGF or 3.6 PSI.
    - d. Size discharge and hot gas risers for positive oil return to compressors.

### 2.3 REFRIGERANT PIPING SPECIALTIES

- A. Refrigerant Dryer:
  - 1. Sporlan material "CATCH-ALL" filter-drier with aluminum molded core:
  - 2. In each liquid line.
  - 3. A three-valve bypass around filter-drier.
  - 4. Install so core can be removed without cutting or breaking any refrigerant line.
- B. Moisture Indicator:
  - 1. Show presence of moisture in system by change of color.
  - 2. Install full size in the main liquid line adjacent to the filter-drier.
  - 3. Use Sporlan "SEE-ALL."
- C. Strainers:
  - 1. Design to permit removing screen without removing strainer from piping system.
  - 2. Screens not larger than 80 mesh.

3. Strainers on liquid line serving each thermostatic expansion valve and in suction line serving each refrigerant compressor not equipped with integral strainer.

D. Oil Traps: Provide in lines as indicated.

## **2.4 VALVES**

A. All Valves:

1. All bronze.
2. 2 IN and less: Solder ends.
3. 3 IN and over: Four bolt union ends.

B. Shut-Off Valves:

1. Packed type with gas-tight cap seal and hard metal seats and shoulders which permit packing stuffing boxes wide open under pressure; or sealed diaphragm type.
2. Wheel, globe, angle or "T" handle.

C. Check Valves:

1. In liquid lines 5/8 IN and less: Lift check type.
2. In lines 3/4 to 2 IN: Swing check type.
3. In lines 3 IN and over: Wafer type swing check with bronze disc.

D. Expansion Valves:

1. Sized by manufacturer for refrigerant used.
2. Provide one in each circuit with liquid distributor connection immediately after.

E. Vent and Test Valves: Angle cap type with seal and outlet caps.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

A. Precharged Line Sets: Install per manufacturer's recommendations.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 23 80 00 HVAC - EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Heating, ventilating, and cooling equipment.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 23 05 13 - Common Motor Requirements for Plumbing and HVAC Equipment.
  - 4. Section 23 05 93 - HVAC Systems - Balancing and Testing.
  - 5. Section 23 09 23 - Instrumentation and Control for HVAC Systems.
  - 6. Section 23 31 00 - HVAC - Ductwork.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Air Conditioning and Refrigeration Institute (ARI).
  - 2. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
    - a. HVAC Applications Handbook, Chapter entitled "Sound and Vibration Control."
    - b. 20, Methods of Testing for Rating Remote Mechanical-Draft Air-Cooled Refrigerant Condensers.
    - c. 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
  - 3. Canadian Standards Association (CSA).
  - 4. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 5. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 6. National Roofing Contractors Association (NRCA).
  - 7. Underwriters Laboratories, Inc. (UL):
    - a. 507, Standard for Electric Fans.
  - 8. Building code:
    - a. International Code Council (ICC):
      - 1) International Building Code and associated standards, 2015 Edition including all amendments, referred to herein as Building Code.
- B. Miscellaneous:
  - 1. Gage thickness specified herein shall be manufacturer's standard gage for steel and Brown and Sharpe gage for non-ferrous metals.
  - 2. Corrosion protection of equipment to be as specified herein.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Fabrication and/or layout drawings.
  - 3. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Wiring diagrams.
    - d. Control diagrams.
    - e. Manufacturer's catalog cuts and technical data.

- f. Corrosion-protection information.
  - g. Fan curves.
  - h. Sound data.
  - i. Vibration isolation.
  - j. Control description.
  - k. Performance data on all equipment.
- 4. Certifications:
  - a. Provide certification of thickness of corrosion-protection coating.
- B. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Vibration isolation assemblies:
    - a. Mason.
    - b. Vibration Mounting and Controls Co.
    - c. Vibro-Acoustics.
  - 2. Corrosion-protective coatings:
    - a. Heresite and Chemical Co.; "Heresite."
    - b. Aero-Marine Engineering, Inc.
    - c. Luvata ElectroFin.
  - 3. Unitary split system heat pump:
    - a. Daikin Applied
    - b. Carrier.
    - c. Lennox.
    - d. Bryant.
- B. Submit request for substitution in accordance with Specification Section 01 25 13.

### **2.2 GENERAL**

- A. All Manufactured Units:
  - 1. Factory wired and assembled.
  - 2. Use fasteners made of same material as unit.
  - 3. Fabricate motor assemblies and unit housings with vibration isolation assemblies:
    - a. Type: As per Table 47, Chapter 48, ASHRAE HVAC Applications Handbook.
- B. All manufactured units shall be constructed with corrosion-resistant materials or have corrosion-resistant coating.
  - 1. Type:
    - a. Corrosion-resistant materials:
      - 1) Aluminum.
      - 2) Stainless steel.
      - 3) FRP.
    - b. Corrosion-resistant coating:
      - 1) Phenolic-based coating:
      - 2) 3 MIL minimum dry thickness, air-dried coating, for surfaces exposed to temperatures less than 150 DEGF.
      - 3) 5 MIL baked-on coating for heat transfer surfaces and surfaces exposed to temperatures greater than 150 DEGF.
      - 4) Factory applied.
      - 5) Provide factory certification of application.

## 2.3 MANUFACTURED UNITS

- A. Equipment Coils:
  - 1. Cooling coils - direct expansion:
    - a. ARI certified.
    - b. Material:
      - 1) Aluminum.
      - 2) Copper with aluminum fins for use in administration units only.
    - c. Fin spacing: Minimum 80 fins per foot.
    - d. Minimum standard operating limit: 250 PSI.
    - e. Size and capacity as scheduled.
  - 2. Heating and cooling coils - water - steam:
    - a. ARI certified.
    - b. Material:
      - 1) Aluminum.
      - 2) Copper with aluminum fins for use in administration units only.
    - c. Fin spacing: Minimum 80 fins per foot.
    - d. Minimum standard operating limit: 200 PSI.
    - e. Equip with vent, drain and condensate connections.
    - f. Size and capacity as scheduled on Drawings.
- B. Unitary Split System Heat Pump:
  - 1. Outdoor Unit:
    - a. Casing and frame:
      - 1) Material: Heavy gage galvanized steel, factory painted.
      - 2) Insulation: 1 IN thick neoprene-coated glass fiber.
      - 3) Installation: Base equipped with lifting brackets with lifting holes.
      - 4) Removable end panel for access to components and connections.
    - b. Compressors:
      - 1) Modulating Scroll type, with 5 year non-prorated warranty.
      - 2) Suction and discharge service valves.
      - 3) Crankcase heater.
      - 4) Thermal overload protection.
    - c. Refrigeration circuit:
      - 1) Sight glass.
      - 2) Filter dryer.
      - 3) Manual shut-off valve.
      - 4) High pressure relief valve.
    - d. Compressor isolators.
    - e. Condenser coils:
      - 1) Nominal 3/8 IN OD seamless copper mechanically bonded to corrugated aluminum fins.
      - 2) Factory leak tested at 315 PSIG under water.
    - f. Condenser fans:
      - 1) Direct drive: See Specification Section 01 61 03.
      - 2) Propeller type.
    - g. Condenser fan motors:
      - 1) Heavy duty, inherently protected, non-reversing.
      - 2) Permanently lubricated bearings.
      - 3) Integral rain shield.
    - h. Defrost control: Defrost cycles at a preselected time interval when the outdoor coil is below a preset initiation temperature.
    - i. Expansion valve: Designed and sized specifically for heat pump service.
    - j. Reversing valve: Four-way interchange reversing valve, operates on pressure differential between the outdoor unit and indoor unit.
  - 2. Indoor unit:
    - a. Materials:

- 1) Casing: Heavy gage steel.
- 2) Framework: Steel angle.
- 3) Pan insulation: Foam-in-place insulation.
- 4) Casing insulation: 1 IN, 3/4 LB fiberglass blanket.
- b. Casing:
  - 1) Sectionalized construction.
  - 2) Removable access panels.
  - 3) Insulated weatherproof casing.
- c. Evaporated fans:
  - 1) Double-width, double-inlet centrifugal type.
  - 2) Forward curved or airfoil.
  - 3) Solid steel shafts.
  - 4) 200,000 HR relubricative ball-bearings.
- d. Fan motors:
  - 1) Relubricative ball-bearings.
  - 2) Variable pitch sheave.
  - 3) Adjustable base.
- e. V-belts and drives sized for 150 PCT motor capacity.
- f. Isolated fan assembly.
- g. Filter section:
  - 1) Access doors for filter removal.
- h. Evaporator coils: See paragraph(s) in Article 2.3, Equipment Coils.
- i. Evaporator coil circuiting:
  - 1) Adjustable thermal expansion valve per circuit with external equalizer.
  - 2) Combination row/split face circuiting.
- j. Drain pan:
  - 1) Mastic-coated.
  - 2) Threaded drain connections.
- k. Electric heating coil: See paragraph(s) in Article 2.3, Equipment Coils.
  - 1) Built-in static-pressure airflow switch.
- l. Size and capacity as scheduled on Drawings.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install fixed pitched drive sheave after sheave has been sized based on accepted test and balance report.

### **3.2 FIELD QUALITY CONTROL**

- A. Comply with Specification Section 23 05 93.

### **3.3 ADJUSTING**

- A. Install new filters on units which have been running prior to acceptance of Project.

## **END OF SECTION**



**DIVISION    26**

**ELECTRICAL**



THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 26 05 00 ELECTRICAL - BASIC REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Basic requirements for electrical systems.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
  - 4. Section 26 05 33 - Raceways and Boxes.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Aluminum Association (AA):
    - a. ADM, Aluminum Design Manual.
  - 2. American Institute of Steel Construction (AISC):
    - a. Steel Construction Manual.
  - 3. American National Standards Institute (ANSI).
  - 4. ASTM International (ASTM):
    - a. A36/A36M, Standard Specification for Carbon Structural Steel.
    - b. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - c. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C2, National Electrical Safety Code (NESC).
  - 6. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 7. National Electrical Manufacturers Association (NEMA):
  - 8. Underwriters Laboratories, Inc. (UL).
- B. Products to be listed by a Nationally Recognized Testing Laboratory (NRTL) in accordance with applicable product standards.
  - 1. Applicable product standards including, but not limited to, ANSI, FM, IEEE, NEMA and UL.
  - 2. NRTL includes, but is not limited to, CSA Group Testing and Certification (CS), FM Approvals LLC (FM), Intertek Testing Services NA, Inc. (ETL), and Underwriters Laboratories, Inc. (UL).

#### **1.3 DEFINITIONS**

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
  - 1. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
  - 2. Architecturally finished interior area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
  - 3. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
  - 4. Highly corrosive and corrosive area: Areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or

chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.

5. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

#### **1.4 SUBMITTALS**

- A. Shop Drawings:
  1. See Specification Section 01 33 00 for requirements for the mechanics and administration of submittal process.
  2. General requirements:
    - a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
    - b. Include data sheets that include manufacturer's name and product model number.
      - 1) Clearly identify all optional accessories.
    - c. Acknowledgement that products are NRTL listed or are constructed utilizing NRTL recognized components.
    - d. Manufacturer's delivery, storage, handling and installation instructions.
    - e. Product installation details.
    - f. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
    - g. See individual specification sections for any additional requirements.
  3. Fabrication and/or layout drawings:
    - a. Concrete and reinforcing steel, per Division 03 requirements.
- B. Operation and Maintenance Manuals:
  1. See Specification Section 01 33 04 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content process of Operation and Maintenance Manuals.
- C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01 33 00 and all Specification Sections shall be submitted simultaneously.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. See Specification Section 01 65 50.
- B. Protect nameplates on electrical equipment to prevent defacing.

#### **1.6 AREA DESIGNATIONS**

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
  1. Outdoor areas:
    - a. Wet.
  2. Indoor areas:
    - a. Dry.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, refer to specific Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.
- B. Provide all components of a similar type by one (1) manufacturer.

#### **2.2 MATERIALS**

- A. Electrical Equipment Support Pedestals and/or Racks:
  1. Manufacturers:

- a. Modular strut:
  - 1) Unistrut Building Systems.
  - 2) B-Line by Eaton.
  - 3) Globe Strut.
  - 4) Superstrut by Thomas & Betts.
- 2. Material requirements:
  - a. Modular strut:
    - 1) Galvanized steel: ASTM A123/123M or ASTM A153/A153M.
    - 2) Stainless steel: AISI Type 316.
    - 3) PVC coated galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 MIL PVC coating.
    - 4) Aluminum: AA Type 6063-T6.
  - b. Structural members (e.g., I beams, L and C channels):
    - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
    - 2) Aluminum: AA Type 6061-T6 or 6063-T6.
  - c. Mounting plates:
    - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
    - 2) Aluminum: AA Type 6063-T6.
  - d. Mounting hardware:
    - 1) Galvanized steel.
    - 2) Stainless steel.
  - e. Anchorage per Specification Section 03 15 19.
  - f. Concrete and reinforcing steel: See Division 03 specifications.
- B. Field touch-up of galvanized surfaces.
  - 1. Zinc-rich primer.
    - a. One coat, 3.0 MILS, ZRC by ZRC Products.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.
- B. Install equipment in accordance with the requirements of:
  - 1. NFPA 70.
  - 2. IEEE C2.
  - 3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
  - 1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
  - 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:
  - 1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
  - 2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
  - 3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
  - 4. See Specification Section 26 05 19 for combining multiple branch circuits in a common conduit.

- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.
- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from air and water piping and equipment.
- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
  - 1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
    - a. Light switch (to center): 46 IN.
    - b. Receptacle in architecturally finished areas (to center): 18 IN.
    - c. Receptacle on exterior wall of building (to center): 18 IN.
    - d. Receptacle in non-architecturally finished areas (to center): 46 IN.
    - e. Telephone outlet in architecturally finished areas (to center): 18 IN.
    - f. Telephone outlet for wall-mounted phone (to center): 46 IN.
    - g. Safety switch (to center of operating handle): 54 IN.
    - h. Pushbutton or selector switch control station (to center): 46 IN.
    - i. Panelboard (to top): 72 IN.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
  - 1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 6 IN in equipment location with the Engineer's approval.
- K. Provide electrical equipment support system per the following area designations:
  - 1. Dry areas:
    - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
    - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
  - 2. Wet areas:
    - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
    - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
- L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
  - 1. See Specification Section 03 15 19.
  - 2. Do not cut, or weld to, building structural members.
  - 3. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- M. Provide non-metallic corrosion resistant spacers to maintain 1/4 IN separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas and on below grade walls.
- N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.
- O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.
- P. Do not use materials that may cause the walls or roof of a building to discolor or rust.

- Q. Identify electrical equipment and components in accordance with Specification Section 10 14 00.
- R. Provide field markings and/or documentation of available short-circuit current (available fault current) and related information for equipment as required by the NFPA 70 and other applicable codes.
- S. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
  - 1. Determine the SCCR rating by one of the following methods:
    - a. Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
    - b. Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
  - 2. The source equipment is new main disconnect.

### **3.2 FIELD QUALITY CONTROL**

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. Cleaning:
  - 1. See Specification Section 01 74 23.
- D. The protective coating integrity of support structures and equipment enclosures shall be maintained.
  - 1. Repair galvanized components utilizing a zinc rich paint.
  - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
  - 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
  - 4. Repair surfaces which will be inaccessible after installation prior to installation.
  - 5. See Specification Section 26 05 33 for requirements for conduits and associated accessories.
- E. Replace nameplates damaged during installation.

### **3.3 DEMONSTRATION**

- A. Demonstrate equipment to the satisfaction of the Owner and Engineer.

### **3.4 PERMITS AND APPROVALS**

- A. The Contractor shall obtain all permits necessary. The Contractor shall furnish inspection by an agency licensed or otherwise qualified to perform electrical inspection in the State of Florida.
- B. The Contractor shall notify the Electrical Inspector, in writing, immediately upon the start of the work and a copy of the notice shall be sent to the Engineer.
- C. Inspection shall be scheduled for rough-in as well as finish work. The rough-in inspection shall be divided into as many inspections as may become necessary to cover all roughing-in.
- D. All costs incidental to the electrical inspection shall be borne by the Contractor.
- E. The Contractor shall furnish certificates of final approval by the electrical inspector and final payment will be withheld until he has presented the Engineer with the aforementioned certificate of approval.
- F. When it is determined by the Electrical Inspector that materials, equipment or installation shown on the Drawings or specified herein are in violation of the National Electrical Code, the Contractor shall contact the Engineer immediately. The Contractor shall be prepared to tell the Engineer the Articles of the National Electrical Code that are violate by the project requirements.

**END OF SECTION**

**SECTION 26 05 19**  
**WIRE AND CABLE - 600 VOLT AND BELOW**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Building wire.
    - b. Power cable.
    - c. Control cable.
    - d. Wire connectors.
    - e. Insulating tape.
    - f. Pulling lubricant.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 26 05 00 - Electrical - Basic Requirements.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 1202, Standard for Flame-Propagation Testing of Wire and Cable.
  - 2. Insulated Cable Engineers Association (ICEA):
    - a. S-58-679, Standard for Control Cable Conductor Identification.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. ICS 4, Industrial Control and Systems: Terminal Blocks.
  - 4. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
    - a. WC 57/S-73-532, Standard for Control Cables.
    - b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
  - 5. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
    - b. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
  - 6. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
    - a. 568, Commercial Building Telecommunications Cabling Standard.
  - 7. Underwriters Laboratories, Inc. (UL):
    - a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
    - b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
    - c. 467, Standard for Safety Grounding and Bonding Equipment.
    - d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
    - e. 486C, Standard for Safety Splicing Wire Connections.
    - f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
    - g. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
    - h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.
    - i. 2250, Standard for Safety Instrumentation Tray Cable.



### 1.3 DEFINITIONS

- A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- B. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, No. 8 AWG and larger.
- C. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.
- D. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Wire connectors.
      - 2) Insulating tape.
      - 3) Cable lubricant.
    - b. See Specification Section 26 05 00 for additional requirements.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 26 05 00.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Building wire, power and control cable, and multiplex cable:
    - a. Aetna Insulated Wire.
    - b. Alphawire.
    - c. Cerrowire.
    - d. Encore Wire Corporation.
    - e. General Cable.
    - f. Okonite Company.
    - g. Southwire Company.
  - 2. Wire connectors:
    - a. Burndy Corporation.
    - b. Buchanan.
    - c. Ideal.
    - d. Ilsco.
    - e. 3M Co.
    - f. Teledyne Penn Union.
    - g. Thomas and Betts.
    - h. Phoenix Contact.
  - 3. Insulating and color coding tape:
    - a. 3M Co.
    - b. Plymouth Bishop Tapes.
    - c. Red Seal Electric Co.

### 2.2 MANUFACTURED UNITS

- A. Building Wire:

1. Conductor shall be copper with 600 V rated insulation.
  2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
  3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for type THHN/THWN and THHN/THWN-2 insulation.
  5. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.
- B. Power Cable:
1. Conductor shall be copper with 600 V rated insulation.
  2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  3. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
  4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
  5. Number of conductors as required, including a bare ground conductor.
  6. Individual conductor color coding:
    - a. ICEA S-58-679, Method 4.
    - b. See PART 3 of this Specification Section for additional requirements.
  7. Conform to NFPA 70 Type TC and IEEE 1202 or CSA FT-4.
- C. Control Cable:
1. Conductor shall be copper with 600 V rated insulation.
  2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
  4. Conform to NEMA/ICEA WC 57/S-73-532 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
  5. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.
    - a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).
  6. Individual conductor color coding:
    - a. ICEA S-58-679, Method 1, Table E-2.
    - b. See PART 3 of this Specification Section for additional requirements.
  7. Conform to NFPA 70 Type TC and IEEE 1202, CSA FT-4 or NFPA 262.
- D. Electrical Equipment Control Wire:
1. Conductor shall be copper with 600 V rated insulation.
  2. Conductors shall be stranded.
  3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  4. Conform to UL 44 for Type SIS insulation.
  5. Conform to UL 83 for Type MTW insulation.
- E. Wire Connectors:
1. Twist/screw on type:
    - a. Insulated pressure or spring type solderless connector.
    - b. 600 V rated.
    - c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
    - d. Phase and neutral conductors: Conform to UL 486C.
  2. Compression and mechanical screw type:
    - a. 600 V rated.
    - b. Ground conductors: Conform to UL 467.

- c. Phase and neutral conductors: Conform to UL 486A.
- 3. Terminal block type:
  - a. High density, screw-post barrier-type with white center marker strip.
  - b. 600 V and ampere rating as required, for power circuits.
  - c. 600 V, 20 ampere rated for control circuits.
  - d. 300 V, 15 ampere rated for instrumentation circuits.
  - e. Conform to NEMA ICS 4 and UL 486A.
- F. Insulating and Color Coding Tape:
  - 1. Pressure sensitive vinyl.
  - 2. Premium grade.
  - 3. Heat, cold, moisture, and sunlight resistant.
  - 4. Thickness, depending on use conditions: 7, 8.5, or 10 MIL.
  - 5. For cold weather or outdoor location, tape must also be all-weather.
  - 6. Color:
    - a. Insulating tape: Black.
    - b. Color coding tape: Fade-resistant color as specified herein.
  - 7. Comply with UL 510.
- G. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Permitted Usage of Insulation Types:
  - 1. Type XHHW-2:
    - a. Building wire and power and control cable in architectural and non-architectural finished areas.
    - b. Building wire and power and control cable in conduit in outdoor areas and below grade.
    - c. Building wire and power and control cable in cable tray in outdoor areas.
  - 2. Type THHN/THWN and THHN/THWN-2:
    - a. Building wire and power and control cable No. 8 AWG and smaller in architectural and non-architectural finished areas.
  - 3. Type SIS and MTW:
    - a. For the wiring of control equipment within control panels.
- B. Conductor Size Limitations:
  - 1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
  - 2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
  - 3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.
- C. Color Code All Wiring as Follows:
  - 1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V
Phase 1	Black
Phase 2	Red *
Phase 3	Blue
Neutral	White
Ground	Green

\* Orange when it is a high leg of a 120/240 V Delta system.

- a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
  - b. Conductors larger than No. 6 AWG:
    - 1) Insulated phase and neutral conductors shall be identified by one of the following methods:
      - a) Continuous colored outer finish along its entire length.
      - b) 3 IN of colored tape applied at the termination.
    - 2) Insulated grounding conductor shall be identified by one of the following methods:
      - a) Continuous green outer finish along its entire length.
      - b) Stripping the insulation from the entire exposed length.
      - c) Using green tape to cover the entire exposed length.
    - 3) The color coding shall be applied at all accessible locations, including but not limited to: Junction and pull boxes.
  2. Power cables ICEA S-58-679, Method 4 with:
    - a. Phase and neutral conductors identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
    - b. Ground conductor: Bare.
  3. Control cables ICEA S-58-679, Method 1, Table E-2:
    - a. When a bare ground is not provided, one of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.
    - b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
- D. Install all wiring in raceway unless otherwise indicated on the Drawings.
- E. Feeder, branch and control circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:
1. Where specifically indicated on the Drawings.
  2. Where field conditions dictate and written permission is obtained from the Engineer.
  3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.
    - a. The combinations shall comply with the following:
      - 1) 12 VDC, 24 VDC and 48 VDC may be combined.
      - 2) 125 VDC shall be isolated from all other AC and DC circuits.
      - 3) AC control circuits shall be isolated from all DC circuits.
  4. Multiple branch circuits for similar loads may be combined in a common raceway, such as multiple lighting circuits or multiple receptacle circuits or other 120Vac circuits. Do not combine lighting and receptacle circuits.
    - a. Do not combine control device circuits with lighting or receptacle circuits.
    - b. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:
      - 1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
      - 2) The neutral conductors may not be shared.
      - 3) Up sizing raceway size for the size and quantity of conductors.
- F. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
1. Feeder and branch power circuits:
    - a. Device outlet boxes:
      - 1) Twist/screw on type connectors.
    - b. Junction and pull boxes and wireways:

- 1) Twist/screw on type connectors for use on No. 8 and smaller wire.
  - 2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.
  - c. Motor terminal boxes:
    - 1) Twist/screw on type connectors for use on No. 10 AWG and smaller wire.
    - 2) Insulated mechanical screw type connectors for use on No. 8 AWG and larger wire.
  2. Control circuits:
    - a. Junction and pull boxes: Terminal block type connector.
    - b. Control panels: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.
  3. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.
- G. Insulating Tape Usage:
1. For insulating connections of No. 8 AWG wire and smaller: 7 MIL vinyl tape.
  2. For insulating splices and taps of No. 6 AWG wire or larger: 10 MIL vinyl tape.
  3. For insulating connections made in cold weather or in outdoor locations: 8.5 MIL, all weather vinyl tape.
- H. Color Coding Tape Usage: For color coding of conductors.

### END OF SECTION

## **SECTION 26 05 26 GROUNDING AND BONDING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for grounding and bonding system(s).
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 10 14 00 - Identification Devices.
  - 4. Section 26 05 00 - Electrical - Basic Requirements.
  - 5. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
  - 6. Section 26 05 33 - Raceways and Boxes.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
  - 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
  - 3. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 4. Underwriters Laboratories, Inc. (UL):
    - a. 467, Grounding and Bonding Equipment.
- B. Assure ground continuity is continuous throughout the entire Project.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data.
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Grounding clamps, terminals and connectors.
      - 2) Exothermic welding system.
    - b. See Specification Section 26 05 00 for additional requirements.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Ground rods and bars and grounding clamps, connectors and terminals:
    - a. ERICO by Pentair.
    - b. Harger Lightning & Grounding.
    - c. Heary Bros. Lightning Protection Co. Inc..
    - d. Burndy by Hubbell.
    - e. Robbins Lightning, Inc.

- f. Blackburn by Thomas & Betts.
  - g. Thompson Lightning Protection, Inc.
- 2. Exothermic weld connections:
  - a. ERICO by Pentair - Cadweld.
  - b. Harger Lightning & Grounding - Ultraweld.
  - c. Burndy by Hubbell - Thermoweld.
  - d. FurseWELD by Thomas & Betts.

## 2.2 COMPONENTS

- A. Wire and Cable:
  - 1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
  - 2. Insulated conductors: Color coded green, per Specification Section 26 05 19.
- B. Conduit: As specified in Specification Section 26 05 33.
- C. Ground Bars:
  - 1. Solid copper:
    - a. 1/4 IN thick.
    - b. 2 or 4 IN wide.
    - c. 24 IN long minimum in main service entrance electrical rooms, 12 IN long elsewhere.
  - 2. Predrilled grounding lug mounting holes.
  - 3. Stainless steel or galvanized steel mounting brackets.
  - 4. Insulated standoffs.
- D. Ground Rods:
  - 1. 3/4 IN x 10 FT, or as indicated on the Drawings.
  - 2. Copper-clad:
    - a. 10 MIL minimum uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
    - b. Corrosion resistant bond between the copper and steel.
    - c. Hard drawn for a scar-resistant surface.
- E. Grounding Clamps, Connectors and Terminals:
  - 1. Mechanical type:
    - a. Standards: UL 467.
    - b. High copper alloy content.
  - 2. Compression type for interior locations:
    - a. Standards: UL 467.
    - b. High copper alloy content.
    - c. Non-reversible.
    - d. Terminals for connection to bus bars shall have two bolt holes.
  - 3. Compression type suitable for direct burial in earth or concrete:
    - a. Standards: UL 467, IEEE 837.
    - b. High copper alloy content.
    - c. Non-reversible.
    - d. Factory filled with oxide inhibiting compound.
- F. Exothermic Weld Connections:
  - 1. Copper oxide reduction by aluminum process.
  - 2. Molds properly sized for each application.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General:
  - 1. Install products in accordance with manufacturer's instructions.

2. Size grounding conductors and bonding jumpers in accordance with NFPA 70, Article 250, except where larger sizes are indicated on the Drawings.
  3. Remove paint, rust, or other non-conducting material from contact surfaces before making ground connections. After connection, apply manufacturers approved touch-up paint to protect metallic surface from corrosion.
  4. Where ground conductors pass through floor slabs or building walls provide nonmetallic sleeves and install sleeve per Specification Section 01 73 20.
    - a. Seal the sleeve interior to stop water penetration.
  5. Do not splice grounding electrode conductors except at ground rods.
  6. Install ground rods and grounding electrode conductors in undisturbed, firm soil.
    - a. Provide excavation required for installation of ground rods and conductors.
    - b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
    - c. Unless otherwise specified, connect conductors to ground rods with compression type connectors or exothermic weld.
    - d. Provide sufficient slack in conductor to prevent conductor breakage during backfill or due to ground movement.
    - e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.
  7. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.
- B. Grounding Electrode System:
1. Provide a grounding electrode system in accordance with NFPA 70, Article 250 and as indicated on the Drawings.
    - a. All grounding electrode conductors terminate on a main ground bar located adjacent to the service entrance equipment.
  2. Grounding electrode conductor terminations:
    - a. Ground bars mounted on wall: Use a two-hole compression type conductor terminal and bolt it to the ground bar with two bolts.
    - b. Ground bars in electrical equipment: Use compression type conductor terminal and bolt it to the ground bar or manufacture's provided mechanical type termination device.
    - c. Piping systems: Use mechanical type connections.
    - d. Building steel, below grade and encased in concrete: Use compression type connector or exothermic weld.
    - e. Building steel, above grade: Use a two-hole compression type conductor terminal and bolt to the steel with two bolts or exothermic weld.
    - f. Ground rod: Compression type or exothermic weld, unless otherwise specified.
    - g. At all above grade terminations, the conductors shall be labeled per Specification Section 10 14 00.
  3. Ground ring grounding system:
    - a. Ground ring consists of ground rods and a conductor looped around the structure.
    - b. Placed at a minimum of 10 FT from the structure foundation and 2 FT-6 IN below grade.
    - c. Provide a minimum of four ground rods placed at the corners of the structure and additional rods so that the maximum distance between ground rods does not exceed 50 FT.
    - d. Building/Structure grounding:
      - 1) Bond building/structure metal support columns to the ground ring at all corners of the structure.
    - e. Grounding conductor: Bare conductor, size as indicated on the Drawings.
  4. Triad grounding system:
    - a. Triad consists of three ground rods arranged in a triangle separated by 20 FT and a conductor interconnecting each ground rod.
    - b. Place first ground rod a minimum of 10 FT from the structure foundation and 2 FT-6 IN below grade.
    - c. Grounding conductor: Bare conductor, size as indicated on the Drawings.



- C. Supplemental Grounding Electrode:
  - 1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
    - a. See Grounding Electrode System paragraph for conductor termination requirements.
  - 2. Metal light poles:
    - a. Connect metal pole and pole base reinforcing steel to a ground rod.
    - b. Grounding conductor: Bare #6 AWG minimum.
  - 3. Equipment support rack and pedestals mounted outdoors:
    - a. Connect metallic structure to a ground rod.
    - b. Grounding conductor: #6 AWG minimum.
- D. Raceway Bonding/Grounding:
  - 1. Install all metallic raceway so that it is electrically continuous.
  - 2. Provide an equipment grounding conductor in all raceways with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.
  - 3. NFPA 70 required grounding bushings shall be of the insulating type.
  - 4. Provide double locknuts at all panels.
  - 5. Bond all conduits, at entrance and exit of equipment, to the equipment ground bus or lug.
  - 6. Provide bonding jumpers if conduits are installed in concentric knockouts.
  - 7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.
- E. Equipment Grounding:
  - 1. Ground all utilization equipment with an equipment grounding conductor.

### **3.2 FIELD QUALITY CONTROL**

- A. Leave grounding system uncovered until observed by Owner.

### **END OF SECTION**

## **SECTION 26 05 33 RACEWAYS AND BOXES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Conduits.
    - b. Conduit fittings.
    - c. Conduit supports.
    - d. Outlet boxes.
    - e. Pull and junction boxes.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 26 05 00 - Electrical - Basic Requirements.
  - 4. Section 26 27 26 - Wiring Devices.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Aluminum Association (AA).
  - 2. American Iron and Steel Institute (AISI).
  - 3. ASTM International (ASTM):
    - a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - c. D2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
  - 4. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
    - c. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
    - d. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
    - e. TC 14.AG, Aboveground Reinforced Thermosetting Resin Conduit and Fittings.
    - f. TC 14.BG, Belowground Reinforced Thermosetting Resin Conduit and Fittings.
  - 5. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
    - a. C80.1, Electric Rigid Steel Conduit (ERSC).
    - b. C80.3, Steel Electrical Metallic Tubing (EMT).
    - c. C80.5, Electrical Aluminum Rigid Conduit (ERAC).
    - d. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
  - 6. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 7. Underwriters Laboratories, Inc. (UL):
    - a. 1, Standard for Flexible Metal Conduit.
    - b. 6, Electrical Rigid Metal Conduit - Steel.
    - c. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
    - d. 360, Standard for Liquid-Tight Flexible Metal Conduit.
    - e. 467, Grounding and Bonding Equipment.
    - f. 514A, Metallic Outlet Boxes.

- g. 514B, Conduit, Tubing, and Cable Fittings.
- h. 651, Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
- i. 797, Electrical Metallic Tubing - Steel.
- j. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
- k. 2420, Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
- l. 2515, Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

### 1.3 SUBMITTALS

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Conduit fittings.
      - 2) Support systems.
    - b. See Specification Section 26 05 00 for additional requirements.
  - 3. Fabrication and/or layout drawings:
    - a. Identify dimensional size of pull and junction boxes to be used.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 26 05 00.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Rigid metal conduits and electrical metallic tubing:
    - a. Allied Tube and Conduit.
    - b. Western Tube and Conduit Corporation.
    - c. Wheatland Tube.
    - d. Patriot Aluminum Products, LLC.
  - 2. Rigid nonmetallic conduit:
    - a. Prime Conduit.
    - b. Cantex, Inc.
    - c. Osburn Associates, Inc.
    - d. Champion Fiberglass, Inc.
    - e. United Fiberglass of America, Inc.
  - 3. Flexible conduit:
    - a. AFC Cable Systems.
    - b. Anamet, Inc.
    - c. Electri-Flex Company.
    - d. International Metal Hose Company.
    - e. Southwire Company, LLC.
  - 4. Conduit fittings and accessories:
    - a. Appleton by Emerson Electric Co.
    - b. Carlon by Thomas & Betts.
    - c. Cantex, Inc.
    - d. Crouse-Hinds by Eaton.
    - e. Killark by Hubbell.
    - f. Osburn Associates, Inc.
    - g. O-Z/Gedney by Emerson Electric Co.
    - h. Raco by Hubbell.
    - i. Steel City by Thomas & Betts.

- j. Thomas & Betts.
- 5. Support systems:
  - a. Unistrut by Atkore International, Inc.
  - b. B-Line by Eaton.
  - c. Kindorf by Thomas & Betts.
  - d. Minerallac Company.
  - e. CADDY by Pentair.
  - f. Superstrut by Thomas & Betts.
- 6. Outlet, pull and junction boxes:
  - a. Appleton by Emerson Electric Co.
  - b. Crouse-Hinds by Eaton
  - c. Killark by Hubbell.
  - d. O-Z/Gedney by Emerson Electric Co.
  - e. Steel City by Thomas & Betts.
  - f. Raco by Hubbell
  - g. Bell by Hubbell.
  - h. Hoffman Engineering.
  - i. Wiegmann by Hubbell.
  - j. B-Line by Eaton.
  - k. Adalet.
  - l. RITTAL North America LLC.
  - m. Stahlin by Robroy Enclosures.

## **2.2 RIGID METAL CONDUITS**

- A. Rigid Galvanized Steel Conduit (RGS):
  - 1. Mild steel with continuous welded seam.
  - 2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
  - 3. Threads galvanized after cutting.
  - 4. Internal coating: Baked lacquer, varnish or enamel for a smooth surface.
  - 5. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6.
- B. Rigid Aluminum Conduit (RAC):
  - 1. AA Type 6063 aluminum alloy, T-1 temper.
  - 2. Maximum copper content of 0.10 PCT.
  - 3. Extruded, seamless.
  - 4. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.5, UL 6.

## **2.3 ELECTRICAL METALLIC TUBING (EMT)**

- A. Mild steel with continuous welded seam.
- B. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
- C. Internal coating: Baked lacquer, varnish, or enamel for a smooth surface.
- D. Standards: NFPA 70 Type EMT, NEMA/ANSI C80.3, UL 797.

## **2.4 RIGID NONMETALLIC CONDUIT**

- A. Schedules 40 (PVC-40):
  - 1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.
  - 2. Rated for direct sunlight exposure.
  - 3. Fire retardant and low smoke emission.
  - 4. Shall be suitable for use with 90 DEGC wire and shall be marked "maximum 90 DEGC".
  - 5. Standards: NFPA 70 Type PVC, NEMA TC 2, UL 651.

## **2.5 FLEXIBLE CONDUIT**

- A. Flexible Galvanized Steel Conduit (FLEX):

1. Formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
2. Standard: NFPA 70 Type FMC, UL 1.

## 2.6 CONDUIT FITTINGS AND ACCESSORIES

- A. Fittings for Use with RGS and RAC.
  1. General:
  2. Locknuts:
    - a. Threaded steel or malleable iron.
    - b. Gasketed or non-gasketed.
    - c. Grounding or non-grounding type.
  3. Bushings:
    - a. Threaded, insulated metallic.
    - b. Grounding or non-grounding type.
  4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
  5. Couplings:
    - a. Threaded straight type: Same material and finish as the conduit with which they are used on.
    - b. Threadless type: Gland compression or self-threading type, concrete tight.
  6. Unions: Threaded galvanized steel or zinc plated malleable iron.
  7. Conduit bodies (ells and tees):
    - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
    - b. Standard and mogul size.
    - c. Cover:
      - 1) Clip-on type with stainless steel screws.
      - 2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
  8. Conduit bodies (round):
    - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
    - b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.
  9. Expansion couplings:
    - a. 2 IN nominal straight-line conduit movement in either direction.
    - b. Galvanized steel with insulated bushing.
    - c. Gasketed for wet locations.
    - d. Internally or externally grounded.
  10. Expansion/deflection couplings:
    - a. 3/4 IN nominal straight-line conduit movement in either direction.
    - b. 30 DEG nominal deflection from the normal in all directions.
    - c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.
    - d. Internally or externally grounded.
    - e. Watertight, raintight and concrete tight.
  11. Standards: UL 467, UL 514B, UL 1203.
- B. Fittings for Use with EMT:
  1. Connectors:
    - a. Straight, angle and offset types furnished with locknuts.
    - b. Zinc plated steel.
    - c. Insulated gland compression type.
    - d. Concrete and raintight.
  2. Couplings:
    - a. Zinc plated steel.
    - b. Gland compression type.
    - c. Concrete and raintight.
  3. Conduit bodies (ells and tees):
    - a. Body: Copper free aluminum with threaded hubs.

- b. Standard and mogul size.
  - c. Cover:
    - 1) Screw down type with steel screws.
    - 2) Gasketed or non-gasketed galvanized steel or copper free aluminum.
  - 4. Standard: UL 514B.
- C. Fittings for Use with FLEX:
  - 1. Connector:
    - a. Zinc plated malleable iron.
    - b. Squeeze or clamp-type.
  - 2. Standard: UL 514B.
- D. Fittings for Use with Rigid Nonmetallic PVC Conduit:
  - 1. Coupling, adapters and conduit bodies:
    - a. Same material, thickness, and construction as the conduits with which they are used.
    - b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
    - c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
  - 2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
  - 3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.
  - 4. PVC based tape, 10 mils thick.
  - 5. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
  - 6. Used with appropriate pipe primer.

## 2.7 ALL RACEWAY AND FITTINGS

- A. Mark Products:
  - 1. Identify the nominal trade size on the product.
  - 2. Stamp with the name or trademark of the manufacturer.

## 2.8 OUTLET BOXES

- A. Metallic Outlet Boxes:
  - 1. Hot-dip galvanized steel.
  - 2. Conduit knockouts and grounding pigtail.
  - 3. Styles:
    - a. 2 IN x 3 IN rectangle.
    - b. 4 IN square.
    - c. 4 IN octagon.
    - d. Masonry/tile.
  - 4. Accessories:
    - a. Flat blank cover plates.
    - b. Barriers.
    - c. Extension, plaster or tile rings.
    - d. Box supporting brackets in stud walls.
    - e. Adjustable bar hangers.
  - 5. Standards: NEMA/ANSI OS 1, UL 514A.
- B. Cast Outlet Boxes:
  - 1. Zinc plated cast iron or die-cast copper free aluminum with manufacturer's standard finish.
  - 2. Threaded hubs and grounding screw.
  - 3. Styles:
    - a. "FS" or "FD".
    - b. "Bell".
    - c. Single or multiple gang and tandem.
  - 4. Accessories: 40 MIL PVC exterior coating and 2 MIL urethane interior coating.
  - 5. Standards: UL 514A, UL 1203.
- C. See Specification Section 26 27 26 for wiring devices, wallplates and coverplates.

## 2.9 PULL AND JUNCTION BOXES

- A. NEMA 1 Rated:
  - 1. Body and cover: 14 GA minimum, galvanized steel or 14 GA minimum, steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
  - 2. With or without concentric knockouts on four sides.
  - 3. Flat cover fastened with screws.
- B. NEMA 3R Rated:
  - 1. Body and cover: 14 GA minimum, steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
  - 2. Drip shield top and seam-free sides, front and back.
  - 3. With or without concentric knockouts on bottom.
  - 4. Slip-on removable cover fastened on bottom edge with screws or continuous hinged cover fastened with screws.
- C. NEMA 12 Rated:
  - 1. Body and cover:
    - a. 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. Type 5052 H-32 aluminum, unpainted.
  - 2. Seams continuously welded and ground smooth.
  - 3. No knockouts.
  - 4. External mounting flanges.
  - 5. Non-hinged cover held closed with captivated cover screws threaded into sealed wells or hinged cover held closed with stainless steel screws and clamps.
  - 6. Flat door with oil resistant gasket.
- D. Miscellaneous Accessories:
  - 1. Rigid handles for covers larger than 9 SQFT or heavier than 25 LBS.
  - 2. Split covers when heavier than 25 LBS.
  - 3. Weldnuts for mounting optional panels and terminal kits.
  - 4. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.
- E. Standards: NEMA 250, UL 50.

## 2.10 SUPPORT SYSTEMS

- A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:
  - 1. Material requirements.
    - a. Galvanized steel: ASTM A123/A123M or ASTM A153/A153M.
    - b. Stainless steel: AISI Type 316.
    - c. PVC coat galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 MIL PVC coating.
- B. Single Conduit and Outlet Box Support Fasteners:
  - 1. Material requirements:
    - a. Zinc plated steel.
    - b. Stainless steel.
    - c. Malleable iron.
    - d. PVC coat malleable iron or steel: 20 MIL PVC coating.
    - e. Steel protected with zinc phosphate and oil finish.

## 2.11 OPENINGS AND PENETRATIONS IN WALLS AND FLOORS

- A. Sleeves, smoke and fire stop fitting through walls and floors:
  - 1. See Specification Section 01 73 20.

## **PART 3 - EXECUTION**

### **3.1 RACEWAY INSTALLATION - GENERAL**

- A. Shall be in accordance with the requirements of:
  - 1. NFPA 70.
  - 2. Manufacturer instructions.
- B. Size of Raceways:
  - 1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
  - 2. Unless specifically indicated otherwise, the minimum raceway size shall be:
    - a. Conduit: 3/4 IN.
    - b. Wireway: 2-1/2 IN x 2-1/2 IN.
- C. Field Bending and Cutting of Conduits:
  - 1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
  - 2. Do not reduce the internal diameter of the conduit when making conduit bends.
  - 3. Prepare tools and equipment to prevent damage to the PVC coating.
  - 4. Degrease threads after threading and apply a zinc rich paint.
  - 5. Debur interior and exterior after cutting.
- D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.
- E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
  - 1. Repair galvanized components utilizing a zinc rich paint.
  - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
- F. Remove moisture and debris from conduit before wire is pulled into place.
  - 1. Pull mandrel with diameter nominally 1/4 IN smaller than the interior of the conduit, to remove obstructions.
  - 2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
  - 3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.
- G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.
- H. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.
- I. Fill openings in walls, floors, and ceilings and finish flush with surface.
  - 1. See Specification Section 01 73 20.

### **3.2 RACEWAY ROUTING**

- A. Raceways shall be routed in the field unless otherwise indicated.
  - 1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
  - 2. Run in straight lines parallel to or at right angles to building lines.
  - 3. Do not route conduits:
    - a. Through areas of high ambient temperature or radiant heat.
    - b. In suspended concrete slabs.
    - c. In concrete members including slabs, slabs on grade, beams, walls, and columns unless specifically located and detailed on structural Drawings..
  - 4. Locate sleeves or conduits penetrating floors, walls, and beams so as not to significantly impair the strength of the construction. Do not place conduit penetrations in columns.



5. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
  6. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 DEG of bends in the conduit run or in long straight runs to limit pulling tensions.
- B. All conduits within a structure shall be installed exposed except as follows:
1. As indicated on the Drawings.
  2. Concealed above gypsum wall board or acoustical tile suspended ceilings.
  3. Conduits in architecturally finished areas shall be concealed.
- C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 FT:
1. Between telecommunication and 125 V, 48 V and 24 VDC, 2 IN.
  2. Between telecommunication and 600 V and less AC power or control: 6 IN.
  3. Between 125 V, 48 V and 24 VDC and 600 V and less AC power or control: 2 IN.
  4. Between 125 V, 48 V and 24 VDC and greater than 600 VAC power: 2 IN.
  5. Between air and water pipes: 6 IN.
- D. Conduits shall be installed to eliminate moisture pockets.
1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.
- E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.
- F. Provide all required openings in walls, floors, and ceilings for conduit penetration.
1. See Specification Section 01 73 20.

### 3.3 RACEWAY APPLICATIONS

- A. Permitted Raceway Types Per Wire or Cable Types:
1. Power wire or cables: All raceway types.
  2. Control wire or cables: All raceway types.
  3. Telecommunication cables: All raceway types.
- B. Permitted Raceway Types Per Area Designations:
1. Dry areas:
    - a. RGS.
    - b. RAC.
  2. Wet areas:
    - a. RGS.
    - b. RAC.
- C. Permitted Raceway Types Per Routing Locations:
1. In stud framed walls:
    - a. EMT.
  2. In concrete block or brick walls:
    - a. PVC-40.
  3. Above acoustical tile ceilings:
    - a. EMT.
  4. Embedded in poured concrete walls and floors:
    - a. PVC-40.
  5. Beneath floor slab-on-grade:
    - a. PVC-40.
- D. FLEX conduits shall be installed for connections to light fixtures, HVAC equipment and other similar devices above the ceilings.
1. The maximum length shall not exceed:
    - a. 6 FT to light fixtures.
    - b. 3 FT to all other equipment.

### 3.4 CONDUIT FITTINGS AND ACCESSORIES

- A. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.
  - 1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.
- B. Install Expansion/Deflection Fittings:
  - 1. Where conduits enter a structure.
  - 2. Where conduits span structural expansions joints.
  - 3. Elsewhere as identified on the Drawings.
- C. Threaded connections shall be made wrench-tight.
- D. Conduit joints shall be watertight:
  - 1. In areas classified as wet.
- E. Terminate Conduits:
  - 1. In metallic outlet boxes:
    - a. RGS and RAC:
      - 1) Conduit hub and locknut.
      - 2) Insulated bushing and two locknuts.
      - 3) Use grounding type locknut or bushing when required by NFPA 70.
    - b. EMT: Compression type connector and locknut.
  - 2. In NEMA 1 rated enclosures:
    - a. RGS and RAC:
      - 1) Conduit hub and locknut.
      - 2) Insulated bushing and two locknuts.
      - 3) Use grounding type locknut or bushing when required by NFPA 70.
    - b. EMT: Compression type connector and locknut.
  - 3. In NEMA 12 rated enclosures:
    - a. Watertight, insulated and gasketed hub and locknut.
    - b. Use grounding type locknut or bushing when required by NFPA 70.
  - 4. When stubbed up through the floor into floor mount equipment:
    - a. With an insulated grounding bushing on metallic conduits.
    - b. With end bells on nonmetallic conduits.
- F. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

### 3.5 CONDUIT SUPPORT

- A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:
  - 1. Dry or wet areas:
    - a. Galvanized system consisting of: Galvanized steel channels and fittings, nuts and hardware and conduit clamps.
    - b. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.
  - 2. Conduit type shall be compatible with the support system material.
    - a. Galvanized steel system may be used with RGS and EMT.
    - b. Stainless steel system may be used with RGS and RAC.
    - c. Aluminum system may be used with RAC.
- B. Permitted single conduit support fasteners per area designations and conduit types:
  - 1. Architecturally finished areas:
    - a. Material: Zinc plated steel, or steel protected with zinc phosphate and oil finish.
    - b. Types of fasteners: Spring type hangers and clips, straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
    - c. Provide anti-rattle conduit supports when conduits are routed through metal studs.

2. Dry or wet areas:
    - a. Material: Zinc plated steel, stainless steel and malleable iron.
    - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
    - c. clamps.
  3. Conduit type shall be compatible with the support fastener material.
    - a. Zinc plated steel, steel protected with zinc phosphate and oil finish and malleable iron fasteners may be used with RGS and EMT.
    - b. Stainless steel system may be used with RGS and RAC.
    - c. Nonmetallic fasteners may be used with PVC-40 and fiberglass.
- C. Conduit Support General Requirements:
1. Maximum spacing between conduit supports per NFPA 70.
  2. Support conduit from the building structure.
  3. Do not support conduit from air or water piping; or from other conduits.
  4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the manufacturer if the support is rated less than 25 LBS.
    - a. Do not exceed maximum concentrated load recommended by the manufacturer on any support.
    - b. Conduit hangers:
      - 1) Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.
    - c. Do not use suspended ceiling support systems to support raceways.
    - d. Hangers in metal roof decks:
      - 1) Utilize fender washers.
      - 2) Not extend above top of ribs.
      - 3) Not interfere with vapor barrier, insulation, or roofing.
  5. Conduit support system fasteners:
    - a. Use sleeve-type expansion anchors as fasteners in masonry wall construction.
    - b. Do not use concrete nails and powder-driven fasteners.

### 3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

- A. General:
1. Install products in accordance with manufacturer's instructions.
  2. See Specification Section 26 05 00 and the Drawings for area classifications.
  3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
  4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.
- B. Outlet Boxes:
1. Permitted uses of metallic outlet boxes:
    - a. Housing of wiring devices:
      - 1) Recessed in all stud framed walls and ceilings.
      - 2) Recessed in poured concrete, concrete block and brick walls of architecturally finished areas and exterior building walls.
    - b. Pull or junction box:
      - 1) Above gypsum wall board or acoustical tile ceilings.
      - 2) Above 10 FT in an architecturally finished area where there is no ceiling.
  2. Permitted uses of cast outlet boxes:
    - a. Housing of wiring devices surface mounted in non-architecturally finished dry, wet.
    - b. Pull and junction box surface mounted in non-architecturally finished dry, wet.
  3. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Specification Section 26 05 00.
  4. Set device outlet boxes plumb and vertical to the floor.
  5. Outlet boxes recessed in walls:

- a. Install with appropriate stud wall support brackets or adjustable bar hangers so that they are flush with the face of the wall.
  - b. Locate in ungrouted cell of concrete block with bottom edge of box flush with bottom edge of block and flush with the face of the block.
6. Back-to-back are not permitted.
7. When an outlet box is connected to a PVC coated conduit, the box shall also be PVC coated.
- C. Pull and Junction Boxes:
  1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
    - a. Make covers of boxes accessible.
  2. Permitted uses of NEMA 1 enclosure:
    - a. Pull or junction box surface mounted above removable ceiling tiles of an architecturally finished area.
  3. Permitted uses of NEMA 3R enclosure:
    - a. Pull or junction box surface mounted in areas designated as wet.
  4. Permitted uses of NEMA 12 enclosure:
    - a. Pull or junction box surface mounted in areas designated as dry.

### **END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 26 24 16 PANELBOARDS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Lighting and appliance panelboards.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 26 05 00 - Electrical - Basic Requirements.
  - 4. Section 26 28 00 - Overcurrent and Short Circuit Protective Devices.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. PB 1, Panelboards.
  - 2. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
    - b. 67, Standard for Panelboards.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data.
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 26 05 00 for additional requirements.
  - 3. Fabrication and/or layout drawings:
    - a. Panelboard layout with alphanumeric designation, branch circuit breakers size and type, as indicated in the panelboard schedules.
- B. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
  - 2. Panelboard schedules with as-built conditions.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Eaton.
  - 2. General Electric.
  - 3. Square D by Schneider Electric.
  - 4. Siemens Corporation.

## 2.2 MANUFACTURED UNITS

- A. Standards: NEMA PB 1, NFPA 70, UL 50, UL 67.
- B. Ratings:
  - 1. Current, voltage, number of phases, number of wires as indicated on the Drawings.
  - 2. Panelboards rated 240 VAC or less: 10,000 AMP minimum short circuit rating or as indicated in the schedule.
- C. Construction:
  - 1. Interiors factory assembled and designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
  - 2. Main lugs: Solderless type approved for copper and aluminum wire.
- D. Bus Bars:
  - 1. Main bus bars:
    - a. Plated aluminum or copper sized to limit temperature rise to a maximum of 65 DEGC above an ambient of 40 DEGC.
    - b. Drilled and tapped and arranged for sequence phasing of the branch circuit devices.
  - 2. Ground bus and isolated ground bus, when indicated on the Drawings: Solderless mechanical type connectors.
  - 3. Neutral bus bars: Insulated 100 PCT rated or 200 PCT rated, when indicated on the Drawings and with solderless mechanical type connectors.
- E. Enclosure:
  - 1. Boxes: Code gage galvanized steel, furnish without knockouts.
  - 2. Trim assembly: Code gage steel finished with rust inhibited primer and manufacturers standard paint inside and out.
  - 3. Lighting and appliance panelboard:
    - a. Trims supplied with hinged door over all circuit breaker handles.
    - b. Trims for surface mounted panelboards, same size as box.
    - c. Doors lockable with corrosion resistant chrome-plated combination lock and catch, all locks keyed alike.
    - d. Nominal 20 IN wide and 5-3/4 IN deep with gutter space in accordance with NFPA 70.
    - e. Clear plastic cover for directory card mounted on the inside of each door.
    - f. NEMA 12 rated: Door gasketed.
- F. Overcurrent and Short Circuit Protective Devices:
  - 1. Main overcurrent protective device:
    - a. Molded case circuit breaker.
  - 2. Branch overcurrent protective devices:
    - a. Mounted molded case circuit breaker.
  - 3. See Section 26 28 00 for overcurrent and short circuit protective device requirements.
  - 4. Factory installed.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install as indicated on the Drawings, in accordance with the NFPA 70, and in accordance with manufacturer's instructions.
- B. Support panelboard enclosures from wall studs or modular channels support structure, per Specification Section 26 05 00.
- C. Provide NEMA 12 rated enclosure as indicated on the Drawings.
- D. Provide each panelboard with a typed directory:
  - 1. Identify all circuit locations in each panelboard with the load type and location served.

2. Mechanical equipment shall be identified by Owner-furnished designation if different than designation indicated on the Drawings.
3. Room names and numbers shall be final building room names and numbers as identified by the Owner if different than designation indicated on the Drawings.

**END OF SECTION**



THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 26 24 19**

### **MOTOR CONTROL EQUIPMENT**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Separately mounted motor starters (including those supplied with equipment).
  - 2. Manual motor starters.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 26 05 00 - Electrical - Basic Requirements.
  - 4. Section 26 28 00 - Overcurrent and Short Circuit Protective Devices.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. International Electrotechnical Commission (IEC).
  - 2. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volt Maximum).
    - b. ICS 2, Controllers, Contactors and Overload Relays Rated 600 V.
    - c. ICS 18, Motor Control Centers.
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. 508, Standard for Industrial Control Equipment.
    - b. 845, Motor Control Centers.
- B. Miscellaneous:
  - 1. Verify motor horsepower loads, other equipment loads, and controls from approved shop drawings and notify Engineer of any discrepancies.
  - 2. Verify the required instrumentation and control wiring for a complete system and notify Engineer of any discrepancies.

##### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 26 05 00 for additional requirements.
  - 3. Fabrication and/or layout drawings:
    - a. Separately mounted combination starters:
      - 1) Unit ladder logic wiring for each unit depicting electrical wiring and identification of terminals where field devices or remote control signals are to be terminated including industry standard symbology of the field devices as indicated on the Drawings, specification and/or loop descriptions. Drawings indicate basic control functionality, provide diagrams for the manufacturer's product(s) meeting the required functionality.
      - 2) Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
- B. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

- b. Fabrication and/or layout drawings updated with as-built conditions.
- C. Informational Submittals:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Service equipment marking and documentation.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Allen-Bradley by Rockwell Automation, Inc.
  - 2. Eaton.
  - 3. General Electric.
  - 4. Square D by Schneider Electric.
  - 5. Siemens Corporation.

### **2.2 SEPARATELY MOUNTED COMBINATION STARTERS**

- A. Standards:
  - 1. NEMA 250, NEMA ICS 2.
  - 2. UL 508.
- B. Enclosure:
  - 1. NEMA 3R.
  - 2. NEMA 12 rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturer's standard paint inside and out.
    - b. No knockouts, external mounting flanges, hinged and gasketed door.
- C. Operating Handle:
  - 1. With the door closed the handle mechanism allows complete ON/OFF control of the unit disconnect and clear indication of the disconnect status.
  - 2. Circuit breaker and MCP operators includes a separate TRIPPED position.
  - 3. Mechanical interlock to prevent the opening of the door when the disconnect is in the ON position with a defeater mechanism for use by authorized personnel.
  - 4. Mechanical interlock to prevent the placement of the disconnect in the ON position with the door open with a defeater mechanism for use by authorized personnel.
  - 5. Padlockable in the OFF position.
- D. External mounted overload relay pushbutton.
- E. Control Power Transformer:
  - 1. 120V secondary.
  - 2. Fused on primary and secondary side.
  - 3. Sized for 140 PCT of required load.
- F. Fault Current Withstand Rating: Equal to the rating of the electrical gear from which it is fed.
- G. Motor Starters: See requirements within this Specification Section.
- H. Disconnect Switch, Overcurrent and Short Circuit Protective Devices:
  - 1. Motor circuit protector.
  - 2. See Specification Section 26 28 00 for overcurrent and short circuit protective device requirements.
  - 3. Factory installed.

### **2.3 MANUAL MOTOR STARTERS**

- A. Standards:

1. NEMA 250, NEMA ICS 2.
  2. UL 508.
- B. Quick-make, quick-break toggle mechanism that is lockable in the OFF position.
- C. Types:
1. Horsepower rated, for ON/OFF control.
  2. Horsepower rated, for ON/OFF control and thermal overload protection.
    - a. Switch to clearly indicate ON, OFF, and TRIPPED position.
- D. Voltage and current ratings and number of poles as required for the connected motor.
- E. Enclosures:
1. NEMA 1 rated:
    - a. Galvanized steel or steel finished with rust inhibiting primer and manufacturer's standard paint inside and out.
    - b. With or without concentric knockouts.
  2. NEMA 3R.
  3. NEMA 12 rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturer's standard paint inside and out.
    - b. No knockouts, external mounting flanges.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install as indicated on the Drawings and in accordance with manufacturer's recommendations and instructions.
- B. Mounting height for surface mounted equipment: See Specification Section 26 05 00.
- C. Provide separately mounted combination starters with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
1. Determine the SCCR rating by one of the following methods:
    - a. Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
    - b. Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
    - c. Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
  2. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the equipment or control panel circuit originates.
  3. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.
- D. Overload Heaters:
1. Size for actual motor full load current of the connected motor.
  2. For motors with power factor correction capacitors, size to compensate for the capacitors effect on load current.
- E. Combination and Manual Starter Enclosures:
1. Permitted uses of NEMA 1 enclosure:
    - a. Surface or flush mounted in architecturally finished areas.
    - b. Surface mounted above 10 FT in areas designated as dry in architecturally and non-architecturally finished areas.
  2. Permitted uses of NEMA 3R enclosure:
    - a. Surface mounted in areas designated as wet.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 26 27 26**

### **WIRING DEVICES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Wall switches.
    - b. Receptacles.
    - c. Device wallplates and coverplates.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 26 05 00 - Electrical - Basic Requirements.
  - 4. Section 26 05 33 - Raceways and Boxes.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. WD 1, General Color Requirements for Wiring Devices.
    - c. WD 6, Wiring Devices - Dimensional Requirements.
  - 2. Underwriters Laboratories, Inc. (UL):
    - a. 20, General-Use Snap Switches.
    - b. 498, Standard for Attachment Plugs and Receptacles.
    - c. 514A, Metallic Outlet Boxes.
    - d. 894, Standard for Switches for Use in Hazardous (Classified) Locations.
    - e. 943, Ground-Fault Circuit-Interrupters.
    - f. 1010, Standard for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.
    - g. 1310, Standard for Class 2 Power Units.

##### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 26 05 00 for additional requirements.

#### **PART 2 - PRODUCTS**

##### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Wall switches and receptacles:
    - a. Bryant Electric.
    - b. Cooper Wiring Devices by Eaton.
    - c. Hubbell Incorporated Wiring Device-Kellems.
    - d. Leviton Manufacturing Company.
    - e. Legrand/Pass & Seymour.

- f. Eaton Crouse-Hinds.
- g. Appleton Electric Co.
- h. Hubbell Killark.

## 2.2 WALL SWITCHES

- A. Basic requirements unless modified in specific requirements paragraph of switches per designated areas or types:
  - 1. Industrial Specification Grade.
  - 2. Quiet action, snap switch.
  - 3. Self-grounding with grounding terminal.
  - 4. Back and side wired.
  - 5. Solid silver cadmium oxide contacts.
  - 6. Rugged thermoplastic and/or nylon housing and one-piece switch arm.
  - 7. Ratings: 20 A, 120/277 VAC.
  - 8. Switch handle type: Toggle.
  - 9. Switch handle color: White.
  - 10. Types as indicated on the Drawings:
    - a. Single-pole.
    - b. Double-pole.
    - c. 3-way.
    - d. 4-way.
    - e. Momentary contact.
  - 11. Standards: UL 20, UL 514A, NEMA WD 1, NEMA WD 6.
- B. Architecturally Finished Area Specific Requirements:
  - 1. Commercial Specification Grade.
  - 2. Quiet action, snap switch.
  - 3. Ratings: 15A, 120/277V.
  - 4. Switch handle type: Decorator rocker or paddle.
  - 5. Switch handle color: White.
  - 6. Wallplate:
    - a. High impact thermoplastic or nylon, color to match handle.
    - b. Single or multiple gang as required.
- C. Dry Non-architecturally Finished Area Specific Requirements:
  - 1. Coverplate for use on surface mounted outlet boxes:
    - a. Cast iron alloy, galvanized and factory painted finish.
    - b. Cast aluminum, natural, lacquer, or factory painted finish.
    - c. Sheet steel, galvanized.
    - d. Sheet aluminum.
    - e. High impact thermoplastic or nylon, color to match handle.
    - f. Single or multiple gang as required.
  - 2. Wallplate for use on recessed outlet boxes:
    - a. High impact thermoplastic or nylon, color to match handle.
    - b. Single or multiple gang as required.

## 2.3 WALL DIMMERS

- A. Dimmer Switches:
  - 1. Electronic solid state type, rated for load, 120 or 277 VAC.
  - 2. Circuit design: Silicon symmetrical gate to provide full wave dimming and withstand current and inverse voltage surges.
  - 3. Power Rating: 1500 W.
  - 4. Switch handle color: White.
  - 5. Control type:
    - a. Linear slide with separate heavy-duty rocker allowing on/off switching without disturbing preset brightness level.
  - 6. Provide built-in filter to minimize noise interference in nearby audio lines.

7. Rated 100 DEGF maximum, ambient.
8. Compatible with ballast.
9. Wallplate:
  - a. High impact thermoplastic or nylon, color to match handle.

## 2.4 RECEPTACLES

- A. Basic requirements unless modified in specific requirements paragraph of receptacles and per designated areas:
  1. Industrial Specification Grade.
  2. Straight blade.
  3. Brass triple wipe line contacts.
  4. One-piece grounding system with double wipe brass grounding contacts and self-grounding strap with grounding terminal.
  5. Back and side wired.
  6. Rating: 20 A, 125 VAC.
  7. High impact nylon body.
  8. Receptacle body color:
    - a. Normal power: White.
    - b. Generator or UPS power: Red.
  9. Duplex or simplex as indicated on the Drawings.
  10. Configuration: NEMA 5-20R.
  11. Standards: UL 498, UL 514A, NEMA WD 1, NEMA WD 6.
- B. Receptacle Type Specific Requirements:
  1. Basic receptacles:
    - a. Weather-resistant when located in exterior locations or interior damp or wet areas as indicated on the Drawings.
      - 1) Identification: Letters "WR" on face of receptacle.
  2. Ground Fault Circuit Interrupter (GFCI):
    - a. Specification Grade.
    - b. Class A protection.
    - c. Feed through type.
    - d. Test and reset buttons.
    - e. Self-testing.
    - f. Visual indicator light.
    - g. Weather-resistant when located in exterior locations or interior damp or wet areas as indicated on the Drawings.
      - 1) Identification: Letters "WR" on face of receptacle.
    - h. Tamper resistant.
    - i. Additional standards: UL 943.
  3. Plug load (PL) control receptacle.
    - a. Commercial Specification Grade.
    - b. Dual controlled (PLD) or half controlled (PLH) as indicated on the Drawings.
    - c. Identification: NEMA approved controlled receptacle marking on face of receptacle.
  4. Combination receptacle and USB charging station:
    - a. Commercial Specification Grade.
    - b. Compatible with USB 2.0 and 3.0 devices.
    - c. USB ports ratings: 5 VDC, 2.1A minimum total charging capacity.
    - d. Configurations as indicated on the drawings:
      - 1) Simplex receptacle with two (2) USB ports.
      - 2) Duplex receptacle with two (2) USB ports.
    - e. Additional standards: UL 1310.
- C. Architecturally Finished Areas Specific Requirements:
  1. Wallplate:
    - a. High impact thermoplastic or nylon, color to match body.
    - b. 302 or 304 brushed finish stainless steel.



- c. Single or multiple gang as required.
- D. Dry Non-Architecturally Finished Areas Specific Requirements:
  - 1. Coverplate for use on surface mounted outlet boxes:
    - a. Cast iron alloy, galvanized and factory painted finish.
    - b. Cast aluminum, natural, lacquer or factory painted finish.
    - c. Sheet steel, galvanized.
    - d. Sheet aluminum.
    - e. High impact thermoplastic or nylon, color to match body.
    - f. 302 or 304 brushed finish stainless steel.
    - g. Single or multiple gang as required.
  - 2. Wallplate for use on recessed outlet boxes:
    - a. High impact thermoplastic or nylon, color to match body.
    - b. 302 or 304 brushed finish stainless steel.
    - c. Single or multiple gang as required.
- E. Exterior Locations Specific Requirements:
  - 1. Coverplate:
    - a. Extra-duty rated, weatherproof (NEMA 3R) while in use, gasketed, stainless steel hardware, copper-free aluminum, 3.2 IN minimum cover depth for #12 AWG cord.

## 2.5 OCCUPANCY SENSORS

- A. Passive Infrared Wall Switch:
  - 1. Self-contained control system that replaces a standard toggle switch.
  - 2. Detection of changes in the infrared energy: Sensor to respond only to those signals caused by human motion.
  - 3. Analog and digital processing to provide immunity to RFI and EMI.
  - 4. Temperature compensated, dual element sensor and a multi-element Fresnel lens.
  - 5. Cover up to 300 SQ FT for walking motion, with a field of view of 180 DEG.
  - 6. System voltage: 120 VAC or 277 VAC.
  - 7. No minimum load.
  - 8. hDIP switch to control the following functions:
    - a. Built-in light level feature adjustable from 8 to 180 FT candles.
    - b. AUTOMATIC-ON or MANUAL-ON operation.
    - c. Time delay adjustable from 30 seconds to 30 minutes.
    - d. High/low sensitivity adjustments.
  - 9. Adjustments and mounting hardware under a removable, tamper resistant cover.
  - 10. Normal operation: OFF and AUTO.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Mount devices where indicated on the Drawings and as scheduled in Specification Section 26 05 00.
- C. See Specification Section 26 05 33 for device outlet box requirements.
- D. Where more than one receptacle is installed in a room, they shall be symmetrically arranged.
- E. Provide blank plates for empty outlets.

### END OF SECTION

**SECTION 26 28 00**  
**OVERCURRENT AND SHORT CIRCUIT PROTECTIVE DEVICES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Low voltage circuit breakers.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 26 05 00 - Electrical - Basic Requirements.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C37.13, Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures.
    - b. C37.16, Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors - Preferred Ratings, Related Requirements, and Application Recommendations.
    - c. C37.17, Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers.
  - 2. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. 489, Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
    - b. 943, Standard for Safety for Ground-Fault Circuit-Interruption.
    - c. 1066, Standard for Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures.

**1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 26 05 00 for additional requirements.
- B. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- C. Informational Submittals:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Reports:
    - a. As-left condition of all circuit breakers that have adjustable settings.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Circuit breakers:
    - a. Eaton.
    - b. General Electric Company.
    - c. Square D Company.
    - d. Siemens.

### **2.2 CIRCUIT BREAKERS**

- A. Molded Case Type:
  - 1. General:
    - a. Standards: UL 489.
    - b. Unit construction.
    - c. Over-center, toggle handle operated.
    - d. Quick-make, quick-break, independent of toggle handle operation.
    - e. Manual and automatic operation.
    - f. All poles open and close simultaneously.
    - g. Three position handle: On, off and tripped.
    - h. Molded-in ON and OFF markings on breaker cover.
    - i. One-, two- or three-pole as indicated on the Drawings.
    - j. Current and interrupting ratings as indicated on the Drawings.
    - k. Bolt on type.
  - 2. Thermal magnetic type:
    - a. Inverse time overload and instantaneous short circuit protection by means of a thermal magnetic element.
    - b. Frame size 150 amp and below:
      - 1) Non-interchangeable, non-adjustable thermal magnetic trip units.
    - c. Frame sizes 225 to 400 amp (trip settings less than 400A):
      - 1) Interchangeable and adjustable instantaneous thermal magnetic trip units.
    - d. Ground Fault Circuit Interrupter (GFCI) Listed:
      - 1) Standard: UL 943.
      - 2) One- or two-pole as indicated on the Drawings.
      - 3) Class A ground fault circuit.
      - 4) Trip on 5 mA ground fault (4-6 mA range).

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Current and interrupting ratings as indicated on the Drawings.
- B. Series rated systems not acceptable.
- C. Devices shall be ambient temperature compensated.
- D. Circuit Breakers:
  - 1. Molded case circuit breakers shall incorporate the following, unless indicated otherwise on the Drawings:
    - a. Frame sizes 400 amp and less with trip setting less than 400A shall be thermal magnetic type.

**END OF SECTION**

## **SECTION 26 28 16 SAFETY SWITCHES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Safety switches.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Section 26 05 00 - Electrical - Basic Requirements.
  - 4. Section 26 28 00 - Overcurrent and Short Circuit Protective Devices.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. KS 1, Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).
  - 2. Underwriters Laboratories, Inc. (UL):
    - a. 98, Enclosed and Dead-Front Switches.

#### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. Provide a Summary Table or use Exhibit A that associates the safety switch features with connected equipment tag number. Exhibit A indicates minimum data required.
    - c. See Specification Section 26 05 00 for additional requirements.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following safety switch manufacturers are acceptable:
  - 1. Eaton.
  - 2. General Electric.
  - 3. Square D by Schneider Electric.
  - 4. Siemens Corporation.
  - 5. Appleton by Emerson Electric Co.
  - 6. Crouse-Hinds by Eaton.
  - 7. Killark by Hubbell.

#### **2.2 SAFETY SWITCHES**

- A. General:
  - 1. Non-fusible or fusible as indicated on the Drawings.
  - 2. NEMA Type HD heavy-duty construction.
  - 3. Switch blades will be fully visible in the OFF position with the enclosure door open.
  - 4. Quick-make/quick-break operating mechanism.
  - 5. Deionizing arc chutes.

6. Manufacture double-break rotary action shaft and switchblade as one common component.
  7. Clear line shields to prevent accidental contact with line terminals.
  8. Operating handle:
    - a. Red and easily recognizable.
    - b. Padlockable in the OFF position.
    - c. Interlocked to prevent door from opening when the switch is in the ON position with a defeater mechanism.
- B. Ratings:
1. Horsepower rated of connected motor.
  2. Voltage and amperage: As indicated on the Drawings.
  3. Short circuit withstand:
    - a. Non-fused: 10,000A.
    - b. Fused: 200,000A.
- C. Accessories, when indicated in PART 3 of this Specification Section or on the Drawings:
1. Neutral kits.
  2. Ground lug kits.
  3. Auxiliary contact kits:
    - a. Opens before main switch.
    - b. Rated 10A at 125/250 VAC.
    - c. One N.O. and one N.C. contact.
- D. Enclosures:
1. NEMA 1 rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. With or without knockouts, hinged and lockable door.
  2. NEMA 3R rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. With or without knockouts, hinged and lockable door.
  3. NEMA 12 rated:
    - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    - b. No knockouts, external mounting flanges, hinged and gasketed door.
- E. Overcurrent and short circuit protective devices:
1. Fuses.
  2. See Specification Section 26 28 00 for overcurrent and short circuit protective device requirements.
- F. Standards: NEMA KS 1, UL 98.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install as indicated and in accordance with manufacturer's instructions and recommendations.
- B. Install switches adjacent to the equipment they are intended to serve unless otherwise indicated on the Drawings.
- C. Permitted uses of NEMA 1 enclosure:
1. Surface or flush mounted in areas designated dry in architecturally finished areas.
- D. Permitted uses of NEMA 3R enclosure:
1. Surface mounted in exterior location for HVAC equipment only.
- E. Permitted uses of NEMA 12 enclosure:

1. Surface mounted in areas designated as dry in non-architecturally finished areas.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 26 41 13 LIGHTNING PROTECTION SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Lightning protection systems using lightning rods.
- B. Scope:
  - 1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required to provide lightning protection systems of the type indicated.
  - 2. Contractor shall furnish the services of individual possessing required qualifications, as indicated in this Section, to prepare the final design of the lightning protection systems required, in accordance with this Section and other Contract Documents. Such services are not delegated design.
  - 3. Provide lightning protection systems for the AES Facility Expansion.
- C. Related Requirements include but are not necessarily limited to:
  - 1. Section 26 05 26 - Grounding and Bonding.

#### **1.2 REFERENCES**

- A. Terminology: In this Section and relative to lightning protection system Work, the terminology indicated below has the following meaning, regardless of whether indicated with initial capital letters:
  - 1. Classification of Buildings in accordance with NFPA 780:
    - a. Class I: Any commercial, industrial, or residential building less than 75 feet in height.
    - b. Class II: Any commercial, industrial, or residential building 75 feet or taller.
- B. Reference Standards:
  - 1. ASTM International (ASTM):
    - a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
  - 2. Lightning Protection Institute (LPI):
    - a. 175, Standard for the Design - Installation - Inspection of Lightning Protection Systems.
  - 3. National Fire Protection Association (NFPA):
    - a. 780, Standard for the Installation of Lightning Protection Systems.
  - 4. National Electrical Manufacturers Association (NEMA):
    - a. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
  - 5. Underwriters Laboratories, Inc. (UL):
    - a. 96, Standard for Safety Lightning Protection Components.
    - b. 96A, Standard for Installation Requirements for Lightning Protection Systems.
    - c. 651, Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.

#### **1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordination – General:
    - a. Contractor shall coordinate the services of lightning protection system designer with all other elements of the Work.
    - b. Contractor has full responsibility for scheduling lightning protection system designs and all related Work.
    - c. Allow sufficient time in Progress Schedule for performance of lightning protection system services, including requests for interpretation or clarification between lightning protection system designer and Contractor and between Contractor and Engineer.
  - 2. Coordination of Lightning Protection System Work's Connections to Other Work:



- a. Where lightning protection system Work connects to other Work designed by Engineer, existing construction, or both, the lightning protection system Work shall be consistent with the other Work and existing construction to which lightning protection system Work connects, and adjacent construction.
  - b. Submit details, loading, anchorage, and other coordinating information necessary for the lightning protection system Work to properly interface with Work designed by Engineer.
  - c. Changes in the Work, whether designed by Engineer, designed by lightning protection system designer, or existing construction, necessary as a result of the lightning protection system are ineligible for increase in Contract Price or Contract Times, unless: (1) otherwise agreed by both Engineer and Owner, or (2) expressly indicated otherwise elsewhere in the Contract Documents for the lightning protection system Work.
  - d. Changes requiring extra compensation, time, or both arising from lightning protection system design aspects needed for convenience of Contractor, Subcontractor, or Supplier, are not grounds for increase in Contract Price or Contract Times.
3. Coordination of Submittals, Fabrication, Production, and Shipment:
- a. Do not release for raw materials procurement, fabrication, production, and shipment to the Site materials, equipment, or systems designed by lightning protection system designer until the associated lightning protection system designer has completed the design and Engineer has reviewed and approved all associated Shop Drawings, product data Submittals, Samples, and such Submittals have been delivered to and accepted by Engineer.
  - b. Allow sufficient time in the Progress Schedule for required Submittals and required actions by lightning protection system designer and Engineer.

#### 1.4 QUALITY ASSURANCE

##### A. Qualifications:

1. Lightning Protection System Designer:
  - a. One individual, acceptable to Engineer, shall design or directly supervise preparation of the final design of all lightning protection systems required for the Work.
  - b. Individual preparing, or directly supervising preparation of, final design of lightning protection systems shall possess current, valid "Designer Inspector" (DI) certification from Lightning Protection Institute (LPI) or "Lightning Protection Master Certification" (LPMC) from Underwriters Laboratories (UL).
  - c. In addition, individual performing, or directly supervising preparation of, final design of lightning protection system shall be able to furnish documentation indicating possession of not less than ten years' experience personally designing or supervising the preparation of lightning protection systems similar to that required for the Work.
  - d. Designer may be employee of lightning protection system Supplier or individual or entity retained by lightning protection system Supplier.
  - e. Submit to Engineer copy of current certification as LPI DI or UL LPMC and record documenting experience of lightning protection system designer. Indicate designer's current employer and employment history.
  - f. Upon Engineer's request, submit information for not less than five prior lightning protection systems, similar in type, scope, and extent to that required for the Work. Construction of each lightning protection system on each such project shall have been substantially complete for not less than one year at the time such documentation is submitted to Engineer. Such information shall include, for each project, the following: project name and location (city, state or province, country); project owner; designer's employer and their role in the project (prime contractor, subcontractor, or supplier); name of project's design professional (company name) and location; year lightning protection system was completed; and general description of scope and extent of lightning protection system work. .
2. Installer:
  - a. Installer of lightning protection system may be Contractor or Subcontractor.

- b. Throughout the Work, installer shall be a current, "UL Listed Lightning Protection Contractor".
- c. Installer's project manager or site superintendent shall possess a current, valid certification as "Master Installer" from LPI. Such individual shall be actively involved in managing and supervising installation of the lightning protection system Work.
- d. Installer shall furnish valid "UL Master Label" for the substantially completed lightning protection system Work.
- e. In addition, installer shall possess not less than five years' relevant experience performing lightning protection system construction and shall be able to document not less than five completed, prior projects or similar scope and complexity to the lightning protection system Work within the most-recent five-year period.
- f. Submit to Engineer documentation of installer's current status as "UL Listed Lightning Protection Contractor" and copy of required LPI "Master Installer" certification.
- g. Upon Engineer's request, submit documentation of required experience.

## 1.5 SUBMITTALS

### A. Action Submittals: Submit the following:

- 1. Shop Drawings:
  - a. Drawings of entire lightning protection system for each building and structure for which lightning protection system is required. Include plans, sections, schematics, and details as appropriate.
  - b. Plan drawings showing type, size, and locations of all lightning protection materials and equipment. Roof penetration detail drawings.
  - c. Submit schedules (tables) of materials and equipment as appropriate, indicating type, size, materials, and location of each, together with other pertinent information.
  - d. "Certificate of Compliance" by lightning protection system designer, in accordance with this Section's Article, "Responsibilities of Lightning Protection System Designer".
- 2. Product Data:
  - a. Data for all materials and equipment required by "Part 2 – Products" of this Section. Submit material and equipment manufacturers' published product data such as catalog pages, standard drawings, expected performance data, specifications, and the like.
  - b. Submit data sheets that include manufacturer's name and product model number. Clearly identify all optional accessories.
  - c. Certification that materials and equipment proposed submitted are in accordance with applicable standards of LPI or UL.

### B. Informational Submittals: Submit the following:

- 1. Certifications and Notices:
  - a. Roofing system manufacturer written consent to installer's proposed penetrations (if any) through roofing system.
- 2. Roofing System Manufacturer's Instructions:
  - a. When Contractor proposes mechanically fastening lightning protection system components to, or providing penetrations through, roofing, obtain and submit to Engineer the roofing system manufacturer's:
  - b. Written concurrence with proposed installation methods.
  - c. Written instructions for sealing penetrations into or through roofing system.
- 3. Supplier's Instructions:
  - a. Manufacturer's written instructions for handling, storage, and installation for all materials and equipment furnished.
- 4. Field Quality Control Results:
  - a. Submit results of field quality control activities required in this Section.
- 5. Supplier's Reports:
  - a. Submit written report of each visit to the Site by manufacturer's factory-trained representative.
  - b. Submit written report of each visit to the Site by lightning protection system designer.
- 6. Qualifications Statements:

- a. Lightning protection system designer.
  - b. Installer.
- C. Closeout Submittals: Submit the following:
  - 1. Post-Installation Certifications:
    - a. Installer's written certification that the substantially completed lightning protection system Work complies with the Contract Documents.
    - b. "UL Master Label" certificate.
  - 2. Operation and Maintenance Data:
    - a. Manufacturer's operation and maintenance manual for each building's or structure's lightning protection system provided or modified. Comply with Section 01 78 23 - Operation and Maintenance Data.
    - b. Indicate requirements for, and frequency of, periodic inspections.
  - 3. Record Documents:
    - a. Prepare and submit drawings, including plans of roof or top of each building and structure for which lightning protection system was provided or modified, indicating as-constructed conditions. Include appropriate sections, details, and schematics.
    - b. Record drawings shall expressly indicate their status as "as-constructed" drawings with an appropriate revision date.

## 1.6 RESPONSIBILITIES OF LIGHTNING PROTECTION SYSTEM DESIGNER

- A. Responsibilities of lightning protection system designer employed on the Work include, but are not necessarily limited to, the following, unless specifically indicated otherwise in the associated elements of the Contract Documents where the lightning protection system is required:
  - 1. Ethical Conduct and Professionalism: Comply with Laws and Regulations, and standards and guidelines regarding codes of ethics and codes of conduct published by relevant industry organizations, including LPI and UL.
  - 2. Comply with Laws and Regulations and relevant design standards applicable to the subject lightning protection system Work.
  - 3. Performance and Design Criteria Indicated in the Contract Documents and Other Information:
    - a. Review performance and design criteria, indicated in the Contract Documents, that the lightning protection system Work must satisfy.
    - b. Prepare written requests for interpretations or clarifications of performance or design criteria.
    - c. Review existing information about the Site that constitutes Technical Data (if any, applicable to the subject lightning protection system Work), as indicated in the Supplementary Conditions.
  - 4. Site Information and Investigations: With Contractor, obtaining all other necessary dimensions, field information, and other information necessary for preparing lightning protection system Shop Drawings.
  - 5. Design Services: Personally, perform and prepare, or actively exercise direct, personal, supervisory control over others performing or preparing:
    - a. Necessary design evaluations of conditions, materials, and equipment.
    - b. Prepare the Shop Drawings and product data Submittals, and related design documents such as calculations, for the subject lightning protection system Work.
    - c. Assist Contractor with applying for and obtaining permits and approvals (not previously obtained by Owner or those for whom Owner is responsible) necessary for the lightning protection system Work.
    - d. Preparing modifications of the lightning protection system design documents as necessary.
  - 6. Certification of Compliance by Lightning protection system designer:
    - a. Through Contractor, submit to Engineer, lightning protection system designer's written certification indicating:
    - b. General Information: (1) Project name and designation, (2) Contractor name and Contract designation, (3) Subcontractor or Supplier name (when applicable), (4) full

- name of lightning protection system designer's business entity under which the lightning protection system services were performed, (5) full name and certification number of the individual responsible for the final design of the subject lightning protection system Work, (6) specific elements of lightning protection system Work to which the certification applies, and (7) lightning protection system designer's signature, and date of signature; apply lightning protection designer's seal when applicable.
- c. Explicit certification that the subject lightning protection system complies with:
    - 1) All applicable performance and design criteria indicated in the Contract Documents. Expressly indicate on certification of compliance the specific performance and design criteria used in the lightning protection system design
    - 2) All Laws and Regulations.
    - 3) Applicable design standards commonly applicable to such types of construction. Expressly indicate such design standards on the certification of compliance.
  - 7. Progress and Quality of Construction of Lightning protection system Work:
    - a. Where appropriate for the subject lightning protection system Work, periodically visit the Site at appropriate intervals to observe the progress and quality of the subject lightning protection system Work.
    - b. Where lightning protection system designer does not visit the Site during construction, keep informed of the progress and quality of the subject lightning protection system Work via discussions with Contractor, Subcontractor, and Suppliers, via photographic documentation, and other means acceptable to lightning protection system designer.
    - c. Advise Contractor in writing when the subject lightning protection system Work is not in accordance with the lightning protection system designer's design documents (approved by Engineer) and related Submittals approved by lightning protection system designer.
    - d. Furnish to entity that retained lightning protection system designer copy of lightning protection system designer's written report of each visit to the Site.
  - 8. Modifications to Design:
    - a. Design appropriate modifications to the lightning protection system Work, including preparing new or revised certifications, reports, design drawings, sketches, design specifications, and calculations, as appropriate.
    - b. Such design documents and calculations shall be submitted to Engineer through Contractor to same extent original design documents Submittals and calculations, if any, where required by the Contract Documents for the subject lightning protection system Work.
  - 9. Other services, as mutually agreed upon by lightning protection system designer and its client, or as required elsewhere in the Contract Documents.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. A/C Lightning Protection, Inc.
  - 2. Harger Lightning & Grounding.
  - 3. Heary Bros. Lightning Protection Co. Inc.
  - 4. National Lightning Protection Corporation.
  - 5. Preferred Lightning Protection, Inc.
  - 6. Thompson Lightning Protection, Inc.
  - 7. VFC Lightning Protection.
  - 8. East Coast Lightning Equipment, Inc.
  - 9. Robbins Lightning, Inc.
  - 10. Or equal.

**2.2 PERFORMANCE AND DESIGN CRITERIA.**

- A. Provide lightning protection systems Work in accordance with NFPA 780, UL 96A, and LPI 175.
- B. Material for air terminals, main conductors and bonding conductors: Copper or aluminum.
- C. Size of air terminals, main conductors, and bonding conductors shall be in accordance with NFPA 780.

**2.3 MATERIALS**

- A. Unless otherwise expressly indicated in the Contract Documents, lightning protection system materials shall be compatible with materials of construction for the building or structure being protected and meet the requirements of UL 96.
- B. Provide lightning protection system with Class I or Class II materials, in accordance with NFPA 780.
- C. Ground Rods:
  - 1. 3/4-inch diameter by 10 feet long.
  - 2. Copper-clad:
    - a. Uniform coating, not less than 10 mils thick, of electrolytic copper molecularly bonded to rigid steel core.
    - b. Corrosion resistant bond between copper and steel.
    - c. Hard drawn, scar-resistant surface.
- D. Material for conductor fasteners, connector fittings, bonding fittings, conductor splicers and through-wall or through-roof assemblies shall be cast bronze, brass, or copper, with bolt pressure connectors.
- E. Material for bolts, nuts, and screws shall be stainless steel.
- F. Underground conductors shall be bare, soft-drawn, stranded copper in accordance with ASTM B8.
- G. Raceways:
  - 1. Indicated as Schedules 40 ("PVC-40") or Schedule 80 ("PVC-80"):
    - a. PVC thermoplastic, with inert modifiers to improve weatherability and heat distribution.
    - b. Rated for direct sunlight exposure.
    - c. Fire retardant and low smoke emission.
    - d. In accordance with NFPA 70 Type PVC, NEMA TC 2, UL 651.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Installation – General:
  - 1. Design and provide lightning protection system Work in accordance with LPI 175, NFPA 780, and UL 96A.
  - 2. Install lightning protection system in accordance with the Contract Documents and Shop Drawings approved by Engineer.
  - 3. Roofing System and Installation of Lightning Protection System:
    - a. Adhesively fasten lightning protection system components to roof system unless expressly shown or indicated otherwise in the Contract Documents.
    - b. Do not mechanically fasten lightning protection system components to metal roof panels or penetrate roof membrane without written consent of both roofing system manufacturer and Engineer. Submit to Engineer written consent of roofing system manufacturer.
    - c. Seal all penetrations in accordance with roofing system manufacturer's written instructions and details. Obtain such instructions and details from roofing system manufacturer.

4. Surge protective devices to be provided, by others, as shown on the Drawings.
- B. Structures and Buildings:
  1. Lightning protection system shall include:
    - a. Roof-mounted air terminals.
    - b. Interconnecting conductors.
      - 1) Steel roof beams and trusses may be utilized as the main and secondary conductors.
    - c. Downleads: Provide the following type(s) of conductor downleads:
      - 1) Conductors surface-mounted on the building's or structure's exterior wall. Route conductor in PVC-80 conduit for a minimum of 1'-0" below grade and 4'-0" above grade.
    - d. Ground terminations.
    - e. Bonding of other grounded systems of building or structure.
    - f. Bonding to grounding electrode system.
  2. Connect downleads to the grounding electrode system ground ring.
  3. Underground connections shall be via exothermic weld.

### 3.2 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
  1. Perform fall-of-potential ground resistance test on each ground rod or ground ring.
    - a. When resistance exceeds 25 ohms for individual ground rod:
      - 1) Provide additional ground rod so they are 20 feet apart, interconnect with #4/0 AWG and retest.
      - 2) If retest exceeds 25 ohms, contact Engineer.
    - b. When resistance exceeds 25 ohms for a ground ring, contact Engineer.
  2. Perform continuity test for system elements concealed within structure.
  3. Perform continuity test for system elements utilized structural steel as downconductors.
  4. Submit to Engineer written results of required field quality control activities expressly indicating building or structure name, and Project, type of test or inspection performed, results obtained, problems observed or noted during the test or inspection, and whether results obtained indicate successful completion (i.e., acceptance). The Work will not be eligible for inspection for Substantial Completion until such results are submitted to and accepted by Engineer.

### 3.3 CLOSEOUT

- A. Documentation and Nameplates.
  1. Prior to requesting inspection for Substantial Completion of lightning protection system Work, provide the following for each lightning protection system provided or modified:
    - a. Nameplate, securely fastened to building or structure, indicating: "Lightning protection system provided by", followed by company name and address of lightning protection system installer. Name plate shall be resistant to corrosion and deterioration (to which it may be subject at its installed location), including deterioration and fading due to exposure to sunlight.
    - b. Submit "UL Master Label" certification.
    - c. Deliver final operation and maintenance manuals for the lightning protection system.
  2. Prior to requesting final payment, deliver to Engineer the following for each lightning protection system provided or modified:

As-constructed record drawings, in accordance with this Section's "Submittals" Article. Such as-constructed drawings shall be developed from Shop Drawings approved by Engineer and those of the Drawings showing the lightning protection system.

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 26 43 13**

### **LOW VOLTAGE SURGE PROTECTION DEVICES (SPD)**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Type 1 SPD - High exposure location in panelboard, integrally mounted.
  - 2. Type 2 SPD - High exposure location in panelboard, externally mounted.
- B. Related Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
    - b. C62.41.1, Guide on the Surge Environment in Low-Voltage (1000V and Less) AC Power Circuits.
    - c. C62.41.2, Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
    - d. C62.45, Recommended Practice on Surge Testing For Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits.
  - 2. Military Standard:
    - a. MIL-STD-220B, Method of Insertion Loss Measurement.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 4. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 5. Underwriters Laboratories, Inc. (UL):
    - a. 1283, Standard for Electromagnetic Interference Filters.
    - b. 1449, Standard for Surge Protective Devices.
- B. Qualifications:
  - 1. Provide devices from a manufacturer who has been regularly engaged in the development, design, testing, listing and manufacturing of SPDs of the types and ratings required for a period of 10 years or more and whose products have been in satisfactory use in similar service.
    - a. Upon request, suppliers or manufacturers shall provide a list of not less than three customer references showing satisfactory operation.

##### **1.3 DEFINITIONS**

- A. Clamping Voltage:
  - 1. The applied surge shall be induced at the 90 DEG phase angle of the applied system frequency voltage.
  - 2. The voltage measured at the end of the 6 IN output leads of the SPD and from the zero voltage reference to the peak of the surge.
- B. Let-Through Voltage:
  - 1. The applied surge shall be induced at the 90 DEG phase angle of the applied system frequency voltage.
  - 2. The voltage measured at the end of the 6 IN output leads of the SPD and from the system peak voltage to the peak of the surge.



- C. Maximum Continuous Operating Voltage (MCOV): The maximum steady state voltage at which the SPD device can operate and meet its specification within its rated temperature.
- D. Maximum Surge Current:
  - 1. The maximum 8 x 20 microsecond surge current pulse the SPD device is capable of surviving on a single-impulse basis without suffering either performance degradation or more than 10 PCT deviation of clamping voltage at a specified surge current.
  - 2. Listed by mode, since number and type of components in any SPD may vary by mode.
- E. Protection Modes: This parameter identifies the modes for which the SPD has directly connected protection elements, i.e., line-to-neutral (L-N), line-to-line (L-L), line-to-ground (L-G), neutral-to-ground (N-G).
- F. Surge Current per Phase:
  - 1. The per phase rating is the total surge current capacity connected to a given phase conductor.
    - a. For example, a wye system surge current per phase would equal L-N plus L-G; a delta system surge current per phase would equal L-L plus L-G.
    - b. The N-G mode is not included in the per phase calculation.
- G. System Peak Voltage: The electrical equipment supply voltage sine wave peak (i.e., for a 480/277 V system the L-L peak voltage is 679V and the L-N peak voltage is 392 V).

#### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Manufacturer's qualifications.
    - b. Standard catalog cut sheet.
    - c. Electrical and mechanical drawing showing unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit.
    - d. Testing procedures and testing equipment data.
    - e. Create a Product Data Sheet for each different model number of SPD provided (i.e., Model XYZ with disconnect and Model XYZ without disconnect, each require a Product Data Sheet).
      - 1) Data in the Product Data Sheet heading:
        - a) SPD Type Number per PART 2 of the Specification.
        - b) Manufacturer's Name.
        - c) Product model number.
      - 2) Data in the Product Data Sheet body:
        - a) Column one: Specified value/feature of every paragraph of PART 2 of the Specification.
        - b) Column two: Manufacturer's certified value confirming the product meets the specified value/feature.
        - c) Name of the nationally recognized testing laboratory that preformed the tests.
        - d) Warranty information.
      - 3) Data in the Product Data Sheet closing:
        - a) Signature of the manufacturer's official (printed and signed).
        - b) Title of the official.
      - 4) Date of signature.
- B. Operation and Maintenance Manuals:
  - 1. See Specification Section 01 33 04 for requirements for:
    - a. The mechanics and administration of submittal process.
    - b. The content of the Operation and Maintenance Manuals.
  - 2. Warranty.

## 1.5 WARRANTY

- A. Minimum of a five year Warranty from date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Standards: IEEE C62.41.1, IEEE C62.41.2, IEEE C62.45, MIL-STD 220B, UL 1283, UL 1449.

### 2.2 TYPE 1 SPD

- A. Product:
  - 1. Integrally mounted in the panelboard.
  - 2. Hybrid solid-state high performance suppression system.
    - a. Do not use a suppression system with gas tubes, spark gaps or other components which might short or crowbar the line resulting in interruption of normal power flow to connected loads.
  - 3. Do not connect multiple SPD modules in series to achieve the specified performance.
  - 4. Designed for parallel connection.
  - 5. Field connection: Use mechanical or compression lugs for each phase, neutral and ground that will accept bus bar or #10 through #1/0 conductors.
  - 6. Device monitor:
    - a. Long-life, solid state, externally visible indicators and Form C dry contact(s) that monitors the on-line status of each mode of the units suppression filter system and power loss in any of the phases.
    - b. A fuse status only monitor system is not acceptable.
- B. Operating Voltage: The nominal unit operating voltage and configuration as indicated on Drawings.
- C. Modes of Protection: All modes.
  - 1. Three phase (delta): L-L, L-G.
  - 2. Three phase (wye): L-N, L-L, L-G and N-G.
  - 3. Single phase (2-pole): L-L, L-N, L-G and N-G.
  - 4. Single phase: L-N, L-G and N-G.
- D. Maximum Continuous Operating Voltage: Less than 130 PCT of system peak voltage.
- E. Operating Frequency: 45 to 65 Hz.
- F. Short Circuit Rating: Equal to or greater than rating of equipment SPD is connected to.
- G. Maximum Surge Current: 240,000 A per phase, 120,000 A per mode minimum.
- H. Minimum Repetitive Surge Current Capacity: 4000 IEEE C High waveform impulses with no degradation greater than 10 PCT deviation of the clamping voltage.
- I. SPD Protection:
  - 1. Integral unit level and/or component level overcurrent fuses and sustained overvoltage thermal cutout device.
  - 2. An IEEE C High waveforms shall not cause the fuse to open and render the SPD inoperable.
- J. Maximum Clamping Voltages: Dynamic test at the 90 degree phase angle including 6 IN lead length and measured from the zero voltage reference:

System Voltage	Test Mode	IEEE C62.41		UL 1449
		C High V & I Wave	B Combination Wave	
<b>L-L &lt; 250 V</b> <b>L-N &lt; 150 V</b>	L-L	1470 V	1000 V	800 V
	L-N	850 V	600 V	500 V
	L-G	1150 V	800 V	600 V
	N-G	1150 V	800 V	600 V
<b>L-L &gt; 250 V</b> <b>L-N &gt; 150 V</b>	L-L	2700 V	2000 V	1800 V
	L-N	1500 V	1150 V	1000 V
	L-G	2000 V	1550 V	1200 V
	N-G	2000 V	1550 V	1200 V

- K. EMI-RFI Noise Rejection: Attenuation greater than 30 dB for frequencies between 100 kHz and 100 MHz.

### 2.3 TYPE 2 SPD

- A. Product:
- Externally mounted next to the panelboard.
  - Hybrid solid-state high performance suppression system.
    - Do not use suppression system with gas tubes, spark gaps or other components which might short or crowbar the line resulting in interruption of normal power flow to connected loads.
  - Do not connect multiple SPD modules in series to achieve the specified performance.
  - Designed for parallel connection.
  - Enclosure:
    - Metallic NEMA 4 or 12 for interior locations.
  - Field connection:
    - Mechanical or compression lugs for each phase, neutral and ground that will accept #10 through #1/0 conductors. OR
    - Preinstalled lead conductors: Size per manufacturer, length as required with a maximum of 5 FT.
  - Device monitor:
    - Long-life, solid state, externally visible indicators and Form C dry contact(s) that monitor the on-line status of each mode of the units suppression filter system or power loss in any of the phase.
    - A fuse status only monitor system is not acceptable.
  - Accessories (when specifically specified): Unit mounted disconnect switch.
- B. Operating Voltage: Nominal unit operating voltage and configuration as indicated on the Drawings.
- C. Modes of Protection: All modes.
- Three phase (delta): L-L, L-G.
  - Three phase (wye): L-N, L-L, L-G and N-G.
  - Single phase (2 pole): L-L, L-N, L-G and N-G.
  - Single phase: L-N, L-G and N-G.
- D. Maximum Continuous Operating Voltage: Less than 130 PCT of system peak voltage.
- E. Operating Frequency: 45 to 65 Hz.
- F. Short Circuit Rating: Equal to or greater than rating of equipment SPD is connected to.
- G. Maximum Surge Current: 240,000 A per phase, 120,000 A per mode minimum.

- H. Minimum Repetitive Surge Current Capacity: 4000 IEEE C High waveform impulses with no degradation of more than 10 PCT deviation of the clamping voltage.
- I. SPD Protection:
1. Integral unit level and/or component level overcurrent fuses and sustained overvoltage thermal cutout device.
  2. An IEEE C High waveforms shall not cause the fuse to open and render the SPD inoperable.
- J. Maximum Clamping Voltages: Dynamic test at the 90 DEG phase angle including 6 IN lead length and measured from the zero voltage reference:

System Voltage	Test Mode	IEEE C62.41		UL 1449
		C High V & I Wave	B Combination Wave	
L-L < 250 V L-N < 150 V	L-L	1470 V	1000 V	800 V
	L-N	850 V	600 V	500 V
	L-G	1150 V	800 V	600 V
	N-G	1150 V	800 V	600 V
L-L > 250 V L-N > 150 V	L-L	2700 V	2000 V	1800 V
	L-N	1500 V	1150 V	1000 V
	L-G	2000 V	1550 V	1200 V
	N-G	2000 V	1550 V	1200 V

- K. EMI-RFI Noise Rejection: Attenuation greater than 30 dB for frequencies between 100 kHz and 100 MHz.

## 2.4 SOURCE QUALITY CONTROL

- A. SPD approvals and ratings shall be obtained by manufacturers from nationally recognized testing laboratories.
- B. The SPD are to be tested as a complete SPD system including:
1. Integral unit level and/or component level fusing.
  2. Neutral and ground shall not be bonded during testing.
  3. 6 IN lead lengths.
  4. Integral disconnect switch when provided.
- C. The “as installed” SPD system including the manufacturers recommended circuit breaker, the SPD is connected to, will not open when tested with a IEEE C3 combination waveform.
- D. Tests to be performed in accordance with IEEE C62.45:
1. Clamping voltage performance testing using IEEE C62.41 Category waveforms.
  2. Single pulse surge current capacity test.
  3. Repetitive surge current capacity testing.
  4. Spectrum analysis for EMI-RFI noise rejection.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Type 1 SPD:
1. Connected in parallel to the equipment.

2. Install in dedicated electrical equipment compartment, bucket or panelboard box at the factory before shipment.
  3. Provide leads that are as short and straight as possible.
  4. Maximum lead length: 12 IN.
  5. Minimum lead size: #2 stranded AWG or bus bar.
  6. Connect leads to the equipment to be protected by one of the following means:
    - a. Through a circuit breaker or molded case switch mounted in the equipment.
    - b. Use manufacturer recommended circuit breaker size.
    - c. Circuit breaker or switch to be operable from the equipment exterior or from behind a hinged door.
- C. Type 2 SPD:
1. Mounting options:
    - a. On wall or support structure adjacent to the equipment to be protected with leads routed through conduit. OR
    - b. Nipple connection directly to the equipment to be protected.
  2. Install leads as short and straight as possible.
  3. Maximum lead length: 5 FT.
  4. Minimum lead size:
    - a. Type 2 and 4 SPD: #2 stranded AWG.
  5. When conduit connection is used, provide a minimum of four twists per foot in the lead conductors and install in NFPA 70 sized conduit.
  6. Connect leads to the equipment to be protected by one of the following means:
    - a. Through a circuit breaker or molded case switch mounted in the equipment.
      - 1) Use manufacturer recommended circuit breaker size.
    - b. Directly to the protected equipment bus, when SPD has integral disconnect switch.
    - c. To the load side of field mounted equipment's local disconnect switch.
      - 1) Provide taps or lugs as required to provide a UL and NFPA 70 compliant connection.

## END OF SECTION

## **SECTION 26 50 00**

### **INTERIOR AND EXTERIOR LIGHTING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Interior building and exterior building mounted luminaires.
    - b. Exterior and site luminaires.
    - c. Lamps and LEDs.
    - d. Drivers.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.
  - 3. Division 03 - Concrete.
  - 4. Section 26 05 00 - Electrical - Basic Requirements.
  - 5. Section 26 05 19 - Wire and Cable - 600 Volt and Below.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American National Standards Institute (ANSI):
    - a. C78.377, Specification for the Chromaticity of Solid State Lighting Products.
  - 2. Federal Communications Commission (FCC):
    - a. Code of Federal Regulations (CFR), 47 CFR 18, Industrial, Scientific and Medical Equipment.
  - 3. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
  - 4. Illuminating Engineering Society of North America (IESNA):
    - a. LM-79, Electrical and Photometric Measurements of Solid-State Lighting Products.
    - b. LM-80, Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules.
  - 5. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. 410, Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts.
    - c. LE 4, Recessed Luminaires, Ceiling Compatibility.
  - 6. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
    - a. SSL 1, Electronic Drivers for LED Devices, Arrays or Systems.
  - 7. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
    - b. 101, Life Safety Code.
  - 8. Underwriters Laboratories, Inc. (UL):
    - a. 248-4, Low-Voltage Fuses - Part 4: Class CC Fuses.
    - b. 924, Standard for Emergency Lighting and Power Equipment.
    - c. 1012, Power Units Other Than Class 2.
    - d. 1310, Standard for Class 2 Power Units.
    - e. 1598, Luminaires.
    - f. 8750, Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products.
  - 9. United States Department of Energy (USDOE):
    - a. EPAAct, the National Energy Policy Act.

### 1.3 DEFINITIONS

- A. Useful Life for LED luminaire light sources:
  - 1. The operating hours before reaching 70 PCT of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions.
  - 2. This is also known as 70 PCT "Rated Lumen Maintenance Life" as defined in IESNA LM-80.

### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. Identify luminaire by Luminaire Schedule designation.
    - c. Luminaire data sheet:
      - 1) Name of manufacturer.
      - 2) Complete order information (catalog number).
      - 3) Description of construction and optics.
      - 4) Total input wattage.
      - 5) Luminous efficacy (lumens/Watt).
      - 6) Photometric performance data including candlepower distribution and coefficient of utilization (CU) table.
      - 7) Dimensional size.
      - 8) Weight.
      - 9) UL nameplate data for luminaires used in Class 1, Division 1 and 2 areas.
      - 10) Effective Projected Areas (EPA) for pole mounted luminaires.
    - d. Solid state Luminaire additional data:
      - 1) Voltage.
      - 2) Initial and IES L70 lumens.
      - 3) Luminous efficacy (lumens/Watt).
      - 4) Correlated Color Temperature (CCT).
      - 5) Color Rendering Index (CRI).
      - 6) Total Harmonic Distortion (THD).
      - 7) Lamp life.
      - 8) Driver manufacturer and model number.
      - 9) Driver life.
      - 10) Driver type (0-10V, constant voltage, constant current).
      - 11) Dimming range and control device compatibility.
      - 12) Remote driver: Maximum wire length to luminaire.
      - 13) Emergency battery driver:
        - a) Compatibility with lighting module.
        - b) Lumen output of lighting module in emergency operation.
        - c) Battery life.
        - d) Description of testing.
        - e) Ambient operating temperature.
      - 14) Toxicity Characteristic Leaching Procedure (TCLP) compliance.
      - 15) DesignLights Consortium (DLC) Listing.
      - 16) Warranty information.
    - e. Luminaire lamp data sheet:
      - 1) Name of manufacturer.
      - 2) Complete order information (catalog number).
      - 3) Wattage.
      - 4) Initial and mean lumens.
      - 5) Luminous efficacy (lumens/Watt).
      - 6) Correlated Color Temperature (CCT).
      - 7) Color Rendering Index (CRI).

- 8) Lamp life.
  - 9) Base configuration.
  - 10) Toxicity Characteristic Leaching Procedure (TCLP) compliance.
  - 11) Warranty information.
  - f. Pole data sheet:
    - 1) Name of manufacturer.
    - 2) Complete order information (catalog number).
    - 3) Description of construction.
    - 4) Length, shaft size and thickness.
    - 5) Wind loading (available luminaire EPA per wind speed).
    - 6) Anchor bolt template.
    - 7) Bolt size and material.
  - g. Photometric calculation for manufacturers not listed in the Luminaire Schedule.
  - h. See Specification Section 26 05 00 for additional requirements.
  3. Test Reports:
    - a. IESNA LM-79 Test Report for Solid-State Luminaire.
    - b. IESNA LM-80 Test Report Solid-State Light Source.
  4. Certifications: Solid-state Luminaire Useful Life Certificate.
- B. Contract Closeout Information:
1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
    - b. Submittal data for each component covered by warranty.
    - c. Warranty.

## 1.5 WARRANTY

- A. Minimum of a five year Warranty from date of manufacture against failure for solid-state luminaire including LED arrays, LED drivers and integral control devices. The solid-state product is considered defective if more than 15 PCT of the individual light emitting diodes fail to illuminate.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Luminaires: Per Luminaire Schedule or equal.
  2. Solid State Light Sources:
    - a. Cree.
    - b. Xicato.
    - c. Luminaire manufacturer's proprietary system.
  3. LED Driver: Luminaire manufacturer's standard.
  4. Emergency transfer devices: Philips Bodine.

### 2.2 GENERAL REQUIREMENTS

- A. Luminaires complete with LED modules and drivers.
- B. Provide all recessed luminaires with gaskets of rubber, fiberglass, or equivalent material to prevent light leaks around flush trim.
1. Provide recessed luminaires with trim gaskets cemented in proper position.
- C. Coordinate luminaire mounting where recessed into building canopies prior to Submitting Shop Drawings. Confirm clearances and luminaire flange compatibility with construction.
- D. Electrical components of recessed luminaires shall be accessible and removable through luminaire without having to remove luminaire from ceiling.



- E. No live parts normally exposed to contact.
- F. When intended for use in wet areas: Mark luminaire "Suitable for wet locations."
- G. When intended for use in damp areas: Mark luminaire "Suitable for damp locations" or "Suitable for wet locations."

## 2.3 LUMINAIRES

- A. Standards and Listings:
  - 1. DesignLights Consortium (DLC).
  - 2. UL 1598.
  - 3. UL 844 for hazardous locations.
  - 4. NEMA LE 4 for recessed locations.
- B. Housings:
  - 1. As indicated in the Luminaire Schedule and the following:
    - a. Troffer luminaires:
      - 1) Minimum 22 gage sheet steel.
      - 2) Integral end plates and trim flanges to suit ceiling construction.
      - 3) Wire way covers with captive retainers to allow access to electrical components without use of tools.
    - b. Extruded aluminum housings, where scheduled, shall be at least 1/8 IN thick.
    - c. Punch and form housings prior to finishing (post-paint).
- C. Trim (Recessed Mounted):
  - 1. As indicated in the Luminaire Schedule and the following:
    - a. For square and rectangular luminaires, miter and continuously weld corners.
    - b. Miter perimeter inverted T-Bar angles at corners.
    - c. Do not butt or overlap squared ends.
    - d. Finish joints smooth.
- D. Castings:
  - 1. As indicated in the Luminaire Schedule and the following:
    - a. Uniform quality, free from imperfections affecting strength and appearance.
    - b. Exterior surfaces, if not receiving a finish coat, shall be smooth and match adjacent surfaces. At least one coat of clear methacrylate lacquer shall be applied unless a painted finish is specified.
- E. Fasteners:
  - 1. As indicated in the Luminaire Schedule and the following:
    - a. Aluminum or steel luminaires: Cadmium-plated or an equivalent.
    - b. Stainless steel luminaires: Stainless steel.
    - c. Bronze luminaires: Bronze or stainless steel.
    - d. Non-metallic luminaires: Stainless steel.
- F. Finishes:
  - 1. As indicated in the Luminaire Schedule and the following:
    - a. Painted surfaces:
      - 1) Manufacturer's standard metal pretreatment and baked or air-dried, light-stabilized enamel finish; acrylic, alkyd, epoxy, polyester or polyurethane.
      - 2) White finishes shall have minimum 85 PCT reflectance.
    - b. Unpainted surfaces:
      - 1) Interior: Clear anodic coating, satin finish.
      - 2) Exterior: Clear anodic coating.
- G. Lens/Louver Frames:
  - 1. As indicated in the Luminaire Schedule and the following:
    - a. Extruded aluminum with mitered corners.
    - b. Hinging or other normal motion shall not cause lens or louver to drop out.
    - c. No light leak between frame and housing.

## H. Lenses:

1. As Indicated in the Luminaire Schedule and the Following:
  - a. 100 PCT virgin, UV stabilized acrylic.
  - b. Linear fluorescent luminaires: Male conical prismatic, minimum thickness 0.150 IN, size as required.
  - c. Held securely in place but must also be removable for cleaning and relamping.
  - d. Luminaires with directional lenses shall include a lens orientation device to ensure that lens installation provides light distribution as designed.
  - e. No light leaks between the lens and the luminaire.

## I. Reflectors:

1. As Indicated in the Luminaire Schedule and the Following:
  - a. Linear fluorescent luminaires: High-purity #12 aluminum reflector sheet, 0.047 IN (15 GA) or heavier, free from fabrication or assembly damages. No exposed rivets, springs or other hardware after installation. Shape reflectors in modified elliptical or parabolic contour to produce no apparent brightness. Lamp image or any part of lamp shall not be visible in 45 DEG zone.
  - b. Down Light Reflector and Baffle Finishes: First-quality "Alzak" anodized specular finish.
  - c. Troffer reflector finish: Integral reflectors shall be painted white after fabrication with a minimum reflectance value of 90 PCT.

## J. Gaskets:

1. As Indicated in the Luminaire Schedule and the Following:
  - a. Gaskets at face plates or frames of recessed luminaires which serve as ceiling trim and which allow interior access.
  - b. Moisture seal gaskets at exterior locations and in other designated wet areas.
  - c. Secure frames to luminaire bodies with screws or other means, to result in tight installation, without light leaks.

## K. Ventilation:

1. Ventilation openings of adequate size and quantity to permit operation of lamps and ballast without affecting rated output or life expectancy. Include wire mesh screens.

## L. Wiring:

1. Factory-wired to be compatible with the project electrical and controls systems.

## M. Mounting Accessories:

1. Provide appropriate mounting accessories for each luminaire, compatible with various structural conditions encountered.
2. All luminaires with adjustable beam angles shall have a locking device to ensure that the beam distribution is not affected during relamping or cleaning.
3. Recessed Luminaires:
  - a. Plaster Frames: Provide frames for luminaires installed in gypsum board and concealed suspension system ceiling tile. Make frames of non-ferrous metal or suitably rustproof after fabrication.
  - b. Baffles and Gaskets: As required to prevent light leakage.
  - c. Flanged luminaires are required in all ceiling systems except exposed grid lay-in panel type.
4. Luminaire Suspension Material:
  - a. Unfinished Spaces:
    - 1) 1/2 IN minimum diameter swivel stem, unless otherwise noted.
    - 2) Safety chain on high bay type.
  - b. Finished Spaces: Unless otherwise noted.
    - 1) Manufactured cable or stem and outlet box canopy.
      - a) Contemporary design with swivel self-aligning features.
      - b) Size canopy to cover outlet box, minimize size of canopy not associated with outlet box.
      - c) Finish to match luminaire.

- 2) Coordinate pendant location with ceiling tiles/ceiling grid.
  - a) Submit coordinated mounting accessories as part of Shop Drawing submission.
- 3) Luminaires mounted on suspended ceiling grids should be provided with outlet box designed for grid mounting with direct cord entry and supported by outlet box.

## 2.4 SOLID-STATE LUMINAIRES - ADDITIONAL REQUIREMENTS

- A. Standards:
  1. IESNA LM-79, IESNA LM-80.
  2. NEMA SSL 1.
  3. UL 1012, 1310, and 8750.
  4. UL 844 for hazardous locations.
- B. Solid state modules and driver to be provided and warranted by luminaire manufacturer.
- C. Solid-State Modules:
  1. Uniform color temperature of 4000K unless otherwise noted on the Luminaire schedule.
    - a. Color temperature measurement shall have a maximum 3 SDCM on the MacAdam Ellipse for frosted lensed luminaires, and 2 SDCM for other luminaire types (ANSI C78.377).
  2. Minimum color rendering index (CRI) of 80.
  3. LED module light output and efficacy: Measured in accordance with IESNA LM-79 standards.
  4. LED useful life and lumen maintenance: Measured in accordance with IESNA LM-80 standards.
  5. Driver and LED module: Minimum useful life of 50,000 HRS (L70).
  6. Individual LEDs connected such that a failure of one LED will not result in a light output loss of the entire luminaire.
- D. Driver:
  1. Compatible with solid-state modules and control devices specified.
  2. Operate from 60 Hz input source of 120V through 277V with sustained variations of  $\pm 10$  PCT (voltage and frequency).
  3. Input current Total Harmonic Distortion (THD): Less than 20 PCT when operated at nominal line voltage.
  4. Power Factor: Greater than 0.90.
  5. Avoid interference with infrared devices and eliminate visible flicker.
  6. Comply with ANSI C62.41 Category A for Transient protection.
  7. Comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).
  8. Dimmable drivers capable of continuous dimming over a range of 100 PCT to 1 PCT of rated lumen output. Dimming controlled by a 0 - 10 VDC signal, unless otherwise specified in Luminaire Schedule.
  9. Control device must be compatible with type of driver, and coordinated prior to submission of Shop Drawings. List of compatible dimming controllers must include the range of perceived brightness. No visible flicker throughout the dimming range.
  10. Remote-mounting:
    - a. Provide maximum allowable distances for secondary wire runs to luminaires.
    - b. Provide remote mounting hardware and enclosures as required.
  11. Operating temperature range must be suitable for site temperature conditions within exterior and gasketed luminaires.
- E. Emergency Battery Driver:
  1. UL 924.
  2. Confirm compatibility with LED modules utilized.
  3. Consist of a high temperature, maintenance-free nickel cadmium battery, charger and electronic circuitry.
  4. A solid state charging indicator light to monitor the charger and battery.

5. Single-pole test switch.
  6. The following product family shall be selected based on coordination with LED lamp type:
    - a. Philips Bodine "BSL23C": can operate up to 4.5W at 410mA.
    - b. Philips Bodine "BSL26C": can operate up to 5.1W at 265mA.
    - c. Philips Bodine "BSL722 IN": can operate up to 23W at 770mA.
    - d. Philips Bodine "BSL23C": can operate up to 23W at 770mA in operating conditions ranging from -20 DEGC (-4 DEGF) to 60 DEGC (140 DEGF).
    - e. Alternate manufacturer: Iota.
- F. Luminaire properly heat sunk to assure LED junction temperature ratings are not exceeded.
1. Provide ambient operating temperature range for which product is warranted.

## 2.5 EXIT SIGNS AND EMERGENCY LIGHTING UNITS

- A. Standards:
1. UL 924.
  2. NFPA 101.
  3. Local State or City requirements.
- B. Exit Signs:
1. Housing and finish: As indicated in the Luminaire Schedule.
  2. LED illuminated with integral driver.
  3. AC powered or AC and battery powered: As indicated in the Luminaire Schedule.
  4. Battery powered units:
    - a. Battery type: As indicated in the Luminaire Schedule.
    - b. Self-testing/self-diagnostic.
      - 1) Electronic circuitry automatically test emergency lighting for a minimum of 30 seconds every 30 days and 90 minutes once a year.
    - c. Consist of batter, charger and electronic circuitry.
    - d. Solid state charging indicator light to monitor the charger and battery.
    - e. Single-pole test switch.
    - f. A user selectable audible alarm. The alarm shall be engaged unless noted otherwise on the Drawings.
- C. Emergency Lighting Units:
1. Housing: As indicated in the Luminaire Schedule.
  2. Lamps: As indicated in the Luminaire Schedule.
  3. Battery type: As indicated in the Luminaire Schedule.
  4. Self-testing/self-diagnostic.
    - a. Electronic circuitry automatically test emergency lighting for a minimum of 30 seconds every 30 days and 90 minutes once a year.
  5. Consist of batter, charger and electronic circuitry.
  6. Solid state charging indicator light to monitor the charger and battery.
  7. Single-pole test switch.
  8. A user selectable audible alarm. The alarm shall be engaged unless noted otherwise on the Drawings.
- D. Emergency Circuit Transfer Device:
1. Transfer device permits emergency lights to be switched under normal conditions and automatically transfers to unswitched emergency circuit upon power interruption.
  2. Multiple luminaire switching:
    - a. Up to 20A.
    - b. Mounting as indicated on the Drawings.
    - c. Acceptable product family:
      - 1) Philips Bodine GTD20A or equal.
  3. Individual luminaire switching:
    - a. Mount on top of luminaire or in ballast channel.
    - b. Acceptable product family:
      - 1) Philips Bodine GTD or equal.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Coordinate Luminaire Types with Ceiling Construction:
  - 1. Provide mounting hardware for the ceiling system in which the luminaire is to be installed.
- B. Fasten luminaires supported by suspended ceiling systems to ceiling framing system with hold down clips.
- C. Provide mounting brackets and/or structural mounting support for wall-mounted luminaires.
  - 1. Do not support luminaire from conduit system.
  - 2. When luminaire is supported from outlet boxes, install per NFPA 70.
  - 3. Supports for luminaire mounted on exterior walls shall not be attached to exterior face of the wall.
- D. Support surface mounted luminaires from the building structure and not from the ceiling suspension system.
  - 1. Luminaires up to 4 FT wide and 4 FT long: A minimum of four supporting points, one at each corner.
  - 2. Luminaires smaller than 2 FT in length: A minimum of two supporting points.
- E. Provide pendant luminaires with swivel hangers which will allow luminaire to swing in any direction but will not permit stem to rotate.
  - 1. Provide hangers with enclosure rating equal to enclosure requirements of area in which they are installed.
  - 2. Swivel hangers for luminaires in mechanical equipment areas: Shock absorbing type.
  - 3. Secure low and high bay luminaires with safety chain or safety aircraft cable to the building structure.
    - a. Chain or cable to prevent luminaire from falling more than 3 IN before the luminaire is caught by the chain or cable.
- F. Provide access panels for recessed luminaires that require access for maintenance when such access is not provided for in design of luminaire.
  - 1. Locate luminaires in accordance with reflected ceiling plans.
- G. Locate luminaire in exact center of ceiling tile unless otherwise indicated.
  - 1. Relocate misinstalled luminaire and replace damaged ceiling materials.
- H. Mount luminaire at heights indicated in Specification Section 26 05 00 or per Luminaire Schedule or as indicated on the Drawings.
- I. Install exterior luminaires so that water can not enter or accumulate in the wiring compartment.

**3.2 ADJUST AND CLEAN**

- A. See Specification Section 01 74 23.
- B. Aim all emergency lighting units, so that, the path of egress is illuminated.

**END OF SECTION**



## DIVISION 28

### ELECTRONIC SAFETY AND SECURITY

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 28 31 00 FIRE ALARM SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Fire Alarm Control Units.
    - b. [Fire Alarm Annunciator Panel.]
    - c. Initiating Devices.
    - d. Notification Appliances.
    - e. Miscellaneous Devices
- B. Related Specification divisions include but are not necessarily limited to:
  - 1. Division 01 - General Requirements.
  - 2. Section 21 05 00 – Fire Protection System
  - 3. Section 23 09 00 - Instrumentation and Control for HVAC Systems.
  - 4. Section 26 05 33 - Raceways and Boxes.

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards (appropriate editions as adopted by Authority(ies) Having Jurisdiction (AHJ) and including all local amendments):
  - 1. Americans with Disabilities Act (ADA):
    - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
    - b. ADA Standards for Accessible Design.
  - 2. FM Global (FM):
    - a. All applicable standards.
    - b. All components FM approved.
  - 3. National Electrical Manufacturers Association (NEMA).
  - 4. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC):
      - 1) Article 760, Fire Alarm Systems.
    - b. 72, National Fire Alarm and Signaling Code.
    - c. 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
    - d. 101, Life Safety Code.
  - 5. National Institute for Certification in Engineering Technologies (NICET).
  - 6. Underwriters Laboratories, Inc. (UL):
    - a. 38, Standard for Manual Signaling Boxes for Fire Alarm Systems.
    - b. 268A, Standard for Smoke Detectors for Duct Applications.
    - c. 464, Standard for Audible Signaling Appliances.
    - d. 497B, Standard for Protectors for Data Communication and Fire Alarm Circuits.
    - e. 864, Standard for Control Units and Accessories for Fire Alarm Systems.
  - 7. Building code:
    - a. Florida Building Code (FBC):
      - 1) Florida Building Code and associated standards, referred to herein as Building Code.
- B. Design Criteria:
  - 1. Provide a complete fire alarm system as described in the Contract Documents and according to criteria of the AHJ and all applicable national and local codes such as NFPA, ADAAG, Building Code, etc.
    - a. Where system requirements described in the Contract Documents exceed those of the AHJ and/or NFPA, meet the requirements of both.



- b. Perform a thorough examination of Contract Documents and shall coordinate with other disciplines and trades, e.g. verification of hazardous area locations requiring equipment rated for that type of environment.
      - c. Contractor shall be responsible for providing a fully functional and code compliant fire alarm system at no additional cost to the Owner.
    2. Submit documents after design has been approved by Authority Having Jurisdiction (AHJ).
    3. The fire alarm system shall be designed by a NICET Fire Alarm Systems Level III or IV engineering technician.
      - a. The designer is responsible for understanding the construction of the building to take in consideration ceiling heights, ceiling construction (flat or not flat), and other features of the building that will affect the layout of devices as required to provide a fire alarm system that is fully compliant with NFPA 72.
    4. If required by state regulations, a Professional Fire Protection Engineer shall seal drawings submitted to the AHJ.
  - C. Service Organization Qualifications:
    1. Offer an annual maintenance contract including complete service and equipment costs for maintenance of complete system.
    2. 10 years experience minimum serving fire alarm systems.
    3. Provide for 24 HR emergency service. Response time to site shall be 24 HRS or less and service office shall be within 250 miles of site.
    4. System shall be installed under the direct supervision of a technician who is factory trained by manufacturer and is certified as a minimum of NICET Level II in Fire Alarm Systems.
  - D. Field quality control:
    1. Manufacturer's field services: Provide service by a factory-authorized and certified service representative to supervise field assembly and connection of components and pre-testing, testing, and adjustment of system.
    2. Pre-testing: Determine, through pre-testing, conformance of system to requirements of drawings and specifications. Correct deficiencies observed in pre-testing. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
    3. Inspection:
      - a. Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
      - b. Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.
  - E. Authority Having Jurisdiction (AHJ) review:
    1. Concurrent or prior to submission to Engineer, submit shop drawing and product data to Authority Having Jurisdiction (AHJ).
    2. Upon receipt of comments from AHJ, make resubmissions, if required, to make clarifications or revisions to obtain approval.
    3. The AHJ shall witness final testing and inspection in order to obtain final approval for system.

### 1.3 DEFINITIONS

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
  1. Outdoor Area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
  2. Architecturally Finished Area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
  3. Non-architecturally Finished Area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.

- a. Highly Corrosive and Corrosive Areas: Rooms or areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
4. Hazardous areas: Class I, II or III areas as defined in NFPA 70.
5. Shop Fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.
6. Service Organization: Commercial entity comprised of professionals capable of providing the technical knowledge and a supply of replacement equipment required for the comprehensive maintenance of a fire alarm system.

#### 1.4 SYSTEM DESCRIPTION

- A. Automatic and manual, addressable, general alarm and non-coded evacuation alarm, supervised, closed-circuit, 24 VDC microprocessor based fire detection and alarm system.
- B. Provide components and features as required by the applicable codes, AHJ and/or Fire Department, including but not limited to following.
  1. Main FACU in [Room 107][as indicated on the Drawings].
  2. Manual stations.
  3. Heat sensors.
  4. Smoke sensors.
  5. Ductwork smoke sensors.
  6. Smoke sensors with auxiliary relays.
  7. Sprinkler flow switch and main waterflow detector circuits.
  8. Main and indicating sprinkler valve tamper switch circuits.
  9. Sprinkler system pressure switch monitoring circuits.
  10. Fan control relays.
  11. Visual and audible notification appliances.
  12. Fire alarm system wire, with all wiring in conduit.
- C. Basic Performance:
  1. Signal Line Circuits (SLC) shall be wired Class B (NFPA Style 4) or Class A (NFPA Style 6).
  2. Notification Appliance Circuits (NAC) shall be wired Class B or Class A.
  3. Each SLC and NAC shall be limited to only 80 PCT of its total capacity at the time of initial installation.
  4. Fire alarm system and all associated equipment and devices shall be suited to the environment in which it is installed.

#### 1.5 SUBMITTALS

- A. Shop Drawings:
  1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  2. Shop drawings submittal shall include minimum required documentation as prescribed in NFPA 72. This includes, but is not limited to, the following:
    - a. Written narrative providing design intent and system description.
    - b. Floor plan layout showing location of all devices and control equipment:
      - 1) Indicate salient features of each device (e.g., weatherproof, strobe candela rating).
      - 2) Designate where protective equipment is provided (e.g. pull station covers, device guards, etc).
    - c. Wiring diagrams (including riser diagram).
    - d. Include system details including location of FACU and all devices and circuiting.
    - e. System power and battery backup calculations and voltage drop calculations to assure that system will operate in accordance with prescribed backup time periods and under all voltage conditions per UL and NFPA standards.
    - f. Provide equipment technical data sheet Submittal for all products specified in product section (PART 2), below.

- g. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs.
  - h. Provide list of all input and output points in system with label indicating location or use of IDC, SLC, NAC, relay, sensor, and auxiliary control circuits.
  - i. Equipment design considerations for future expansion as indicated.
  - j. Operating instructions for FACU.
  - k. Completed NFPA 72 record of inspection and testing (see Contract Closeout Information: below for additional requirements).
  - l. Copy of site specific software.
  - m. Name of local service organization.
  - n. Documentation of AHJ approval for system submittal.
- B. Contract Closeout Information:
- 1. Operation and Maintenance Data:
    - a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
  - 2. Field test reports.
  - 3. Owner instruction report.
  - 4. Prorata warranty for batteries.
  - 5. Spare parts: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:
    - a. Manual Stations: Furnish quantity equal to 15 PCT of number of manual stations installed but no less than one.
    - b. Notification Appliances: Furnish quantity equal to 5 PCT of each type and number of units installed, but not less than one of each type.
    - c. Automatic initiation devices including but not limited to smoke sensors and heat sensors: Furnish quantity equal to 5 PCT of each type and number of units installed but not less than one of each type.
    - d. Detector or Sensor Bases: Furnish quantity equal to 2 PCT of each type and number of units installed but not less than one of each type.

## 1.6 AREA DESIGNATIONS

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
- 1. Outdoor areas:
    - a. Wet.
    - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specification Sections.
  - 2. Indoor areas:
    - a. Dry.
    - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specification Sections.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable.
- 1. Fire alarm system:
    - a. Edwards Systems Technology (EST).
    - b. Gamewell FCI.
    - c. Notifier.
    - d. Monaco.
    - e. Siemens Industry.
    - f. Silent Knight.

- g. Simplex Grinnell.
  - h. Cooper Wheelock.
- 2. Manufacturer must have a service organization local to the project site[s].
- B. All Equipment:
  - 1. UL listed as a product of a single manufacturer under appropriate category.
  - 2. Equipment shall not be modified or installed to alter or void UL label or listing.
  - 3. FM approved.
  - 4. Approved by Fire Marshal.

## 2.2 MAIN FIRE ALARM CONTROL UNIT (FACU)

- A. FACU shall perform operations as described in Fire Alarm System Operation:
- B. The Fire Alarm system shall have 100 point minimum initiating device capacity with the capability to add additional 100 point minimum initiating device control modules.
- C. Construction shall be modular with solid-state, microprocessor-based electronics.
  - 1. An 80-character LCD display shall indicate alarms, supervisory service conditions and any troubles.
- D. Keyboards or keypads shall not be required to operate system during fire alarm conditions.
- E. Provide necessary switches, relays, indicator lamps, wiring terminals, etc., to provide complete operation supervising, control, and testing facilities for entire system.
- F. FACU shall allow for loading or editing special instructions and operating sequences as required.
  - 1. System shall be capable of on-site programming to accommodate and facilitate expansion, building parameter changes or changes as required by local codes.
  - 2. All software operations shall be stored in a non-volatile programmable memory within FACU.
- G. System shall have provisions for disabling and enabling all circuits individually for maintenance and testing purposes.
- H. System shall be capable of logging and storing 300 events in a history log.
  - 1. These events shall be stored in a battery protected random access memory.
  - 2. Each recorded event shall include time and date of that event's occurrence.
  - 3. System shall have capability of recalling alarms, supervisory conditions, trouble conditions, acknowledgments, silencing and reset activities in chronological order for purpose of recreating an event history.
- I. FACU shall be listed under UL 864.
- J. Existing FACU should be interconnected with new FACU in accordance with NFPA 72, 2022 edition, paragraphs 23.8.2.7 through 23.8.2.9.3.
- K. FACU shall be in an enclosed metal cabinet with glass door specifically designed for public areas.
  - 1. Mounting: Surface.
  - 2. Finish: Red] baked enamel.
- L. Each addressable device shall be represented individually in FACU.
  - 1. Indicate TROUBLE by a discreet LCD readout for each supervised circuit.
  - 2. Indicate ALARM by a discreet LCD readout for each alarm initiating addressable device.
  - 3. Include individual supervisory and alarm relays in each circuit arranged so that ground or open condition in any circuit or group of circuits, will not affect proper operation of any other device.
- M. FACU shall include the capability to report alarm and trouble conditions via a telephone line to a third party alarm reporting services.

- N. FACU shall include a system testing capability to help ensure that zoning and supervision have been maintained throughout system.
1. Actuation of the enable walk test program at FACU shall activate "Walk-Test" mode of system which shall cause the following to occur:
    - a. Third party reporting connection circuit shall be disconnected or put in test mode with central station.
    - b. Control relay functions shall be bypassed.
    - c. FACU shall indicate a trouble condition.
    - d. FACU shall, at a minimum, be capable of causing audible signals to activate for 2 SEC upon alarm activation of any initiation device.
    - e. FACU shall automatically reset itself after code is complete.
    - f. Any momentary opening of alarm initiating or alarm indicating circuit wiring shall cause audible signals to sound continuously for 4 SEC to indicate trouble condition.
    - g. System shall have four distinctive walk test groups such that only a portion of system need be disabled during testing and an alarm in any other area will be processed normally.
- O. General Alarm Circuits: Positive non-interfering type so that a second device can be annunciated simultaneously, or closely following first zone.
- P. Power Supply:
1. Power limited operation per NFPA 70, Article 760.
  2. 120 VAC dedicated circuit from panel board to integral 24 VDC regulated power supply in FACU and battery charger.
    - a. The power supply shall provide all panel and peripheral device power needs.
  3. If the FACU cannot provide power for the required number of notification appliances a power extender shall be used.
    - a. An additional 120 VAC dedicated circuit from a panel board shall be used to power the power extenders power supply and battery charger.
  4. Provide transient voltage surge suppression (TVSS) for Main FACU for power supply and communication channel(s).
- Q. Battery:
1. Low maintenance sealed type, for fire alarm use with automatic battery charger.
  2. Fire alarm systems without voice evacuation capability shall be provided with batteries capable of operating maximum normal load of system for 24 HRS and then capable of operating system for 5 minutes in alarm condition.
  3. Fire alarm systems with voice evacuation capability shall be provided with batteries capable of operating maximum normal load of system for 24 HRS and then capable of operating system for 15 minutes in alarm condition.
  4. Size batteries for the total maximum number of devices that can be connected to the FACU not the install number of devices.
  5. The notification appliance power extender shall have the same battery requirements as the FACU.

## 2.3 INITIATING DEVICES

- A. Addressable Manual Pull Stations:
1. Pull-type with handle which shall lock in a protruding manner to facilitate quick visual identification of activated station.
    - a. Reset using key or special tool after operation.
    - b. Non-coded.
    - c. Single action.
  2. High impact red Lexan with operating directions in white letters.
    - a. Semi-flush mounted in architecturally finished areas.
    - b. Surface mounted in non-architecturally finished areas.
    - c. Surface mounted with clear Lexan weatherproof protective shield in areas designated as wet or in areas indicated in the schedules herein.

3. Stations shall be keyed alike with FACU.
  4. Standards: UL 38.
- B. Addressable Detector Base:
1. Plug-in arrangement:
    - a. Detector and associated encapsulated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection.
    - b. The plug connection requires no springs for secure mounting and contact maintenance.
    - c. Terminals in the fixed base accept building wiring.
    - d. Detector construction shall have a mounting base with a twist-lock detecting head that is lockable.
    - e. The locking feature must be field removable when not required.
    - f. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the Control Unit.
  2. LED that will flash each time it is scanned by the Control Unit.
    - a. When the Control Unit determines that a detector is in an alarm or a trouble condition, the Control Unit shall command the LED on that detector's base to turn on steady indicating that abnormal condition exists.
    - b. Detectors which do not provide a visible indication of an abnormal condition at the detector location shall not be acceptable.
  3. Each detector shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another detector type.
    - a. The Control Unit shall operate with the installed device but shall initiate a "Wrong Device" or "Incorrect Device ID" trouble condition until the proper type is installed or the programmed detector type is changed.
  4. Addressability: Detectors include a communication transceiver in the detector or mounting base having a unique identification and capability for status reporting to the FACU.
  5. Provide auxiliary relays in detector base to provide local control of equipment as described under system operation.
    - a. Provide separate 24 VDC supply to detector base with auxiliary relays to guarantee that sufficient power will be available to operate relays.
- C. Air Duct Smoke Detector:
1. Duct smoke detectors shall utilize addressable photoelectric type detector as specified herein.
  2. Duct housing mounted directly to outside of duct with a sampling tube extended across duct to sample air movement.
  3. Duct housing couplings slotted to insure proper alignment of sampling and exhaust tubes.
    - a. Tube lengths as required per duct width.
  4. Detector housing shall have an alarm LED visible through front cover.
  5. Remote red LED alarm indicators shall be provided on the wall or ceiling adjacent to detectors above the ceiling or that are not visible from the ground.
    - a. Duct detectors in non-accessible locations shall be provided with a remotely located test switch to provide for ease of testing.
  6. Standards: UL 268A.
- D. Addressable Monitor Modules:
1. Provides addressability and supervision to a conventional initiating device (e.g., tamper switches, pressure switches, flow switches, etc).
    - a. The conventional initiating device shall be wired Class B, Style B.
  2. Integral or remote LED shall be provide that will flash each time it is scanned by the FACU.
    - a. When the FACU determines that a monitor module is in an alarm or a trouble condition, the FACU shall command the LED on that module to turn on steady, change color, or otherwise indicate that an abnormal condition exists.
- E. Sprinkler System Devices:
1. Provide monitor module as specified herein for waterflow switches(s).
    - a. Waterflow switches provided in Specification Section 21 05 00.

2. Provide monitor module as specified herein, for tamper switches associated with main water valve, or OS&Y valves.
  - a. Tamper switches provided in Specification Section 21 05 00.

## 2.4 NOTIFICATION APPLIANCES

- A. Alarm Horns:
  1. Electric-vibrating polarized type, operating on 24 VDC, with provision for housing the operating mechanism behind a grille.
  2. Horns produce a sound pressure level of 85 dB, measured at 10 FT.
  3. Housing: Red with white "FIRE" lettering.
    - a. Semi-flush or flush mounted in architecturally finished areas.
    - b. Surface-mounted in non-architecturally finished areas.
  4. Horns shall be weatherproof in areas designated as wet.
- B. Alarm Strobes:
  1. White tamper resistant lexan lens with 24 VDC xenon strobe.
  2. Provide Candela rating as required per ADA and synchronize of multiple strobes when required.
  3. Housing: Red with white "FIRE" lettering.
    - a. Semi-flush or flush mounted in architecturally finished areas.
    - b. Surface-mounted in non-architecturally finished areas.
  4. Strobes shall be weatherproof in areas designated as wet or in areas indicated in the schedules herein.
- C. Combination Audio/Visual Devices:
  1. Shall be mounted in an integral unit and shall have the same features as the individual units specified in the previous sub sections.
- D. Standards: UL 464, UL 1971.

## 2.5 MISCELLANEOUS DEVICES

- A. Isolated Loop Circuit Protector (Transient Suppression):
  1. Hybrid solid state high performance suppression system.
    - a. Do not use gas tubes, spark gaps or other suppression system components which might short or crowbar the line resulting in interruption of normal power flow to connected loads.
  2. Line-to-line response time of less than 1 nanosecond capable of accepting a 2000 A (8 x 20 usec pulse) at 28 V.
  3. Line-to-ground response time of less than 1 nanosecond capable of accepting a 2000 A (8 x 20 usec pulse) to earth.
  4. Shield-to-ground shall be capable of accepting a 5,000 A (10 x 50 usec pulse) to earth.
  5. Standard: UL 497B.
- B. Fault Isolation Module:
  1. Bi-directional short circuit protection for SLC communication lines.
  2. Isolators optimize communication integrity by creating device groups, any group with short circuited wiring can be isolated, allowing communications to continue to the other groups.
  3. FACU mounted or individually mounted.

## 2.6 WIRING

- A. Conduit:
  1. 1/2 IN minimum.
  2. See Specification Section 26 05 33.
- B. Conductors:
  1. Insulation type per NFPA 70, Article 760.
  2. 120 VAC and power supply connections: 12 GA, minimum.
  3. Low-voltage general alarm circuits: 14 GA, minimum.

4. Low-voltage initiating circuits: 18 GA, minimum.
5. Annunciator and data communication circuits: As required by manufacturer, UL listed.
6. Use larger wire sizes when recommended by equipment manufacturer and per voltage drop calculations.

C. Outlet Boxes: See Specification Section 26 05 33.

## 2.7 SYSTEM OPERATION

- A. Activation of any alarm-causing Initiating device shall cause the following:
  1. General evacuation notification via activation of audible and visual notification appliances.
  2. Automatic control devices to operate as defined by the operating sequences.
  3. Alarm information shall be displayed at the FACU.
- B. All fire alarm signals are automatically locked on the display of the FACU until originating device is returned to normal and FACU is manually reset.
  1. Audible alarm signals shall be silence-able from FACU allowing for re-initiation following a subsequent alarm.
    - a. Silencing of alarm signals shall not impair ability of system to continue to perform as specified.
- C. Air Handling Equipment Fan Control:
  1. De-energize indicated air-handling equipment and interlocked exhaust fans upon alarm and close all associated smoke dampers.
  2. See Specification Section 23 09 00 for mechanical equipment sequence of operation and coordinate all fan controls.
  3. Fans shall not restart until FACU is manually reset.
- D. Activation of any system trouble shall initiate the following:
  1. Common audible trouble signal shall sound and common trouble light shall illuminate at the FACU, any FAA's, and any remote FACU's.
  2. Specific device in trouble shall be indicated.
- E. Audible trouble signal shall be silenceable by FACU.
  1. Visual trouble indication remains until trouble condition is corrected.
    - a. A subsequent trouble condition received after manually silencing shall cause audible trouble signal to resound.
    - b. Restoration of system to normal causes audible trouble signal until silencing switch is returned to normal position.
  2. Trouble signal(s) will be initiated under following conditions:
    - a. Open on an initiation or alarm indicating circuit.
    - b. Open in wiring to any FAA or any remote FACU's.
    - c. Ground fault condition.
    - d. Auxiliary manual control switch out of normal position.
    - e. Loss of 120 VAC operating power to the Main FACU or any Remote FACU's.
    - f. Low or no battery voltage condition.
    - g. Main sprinkler valve is closed.
    - h. Post indicator valve is closed.
    - i. Any sprinkler or standpipe indicating valve is closed.
- F. Install isolated loop circuit protectors on all fire alarm data communication circuits, SLC and NAC wiring, including shields, which extends beyond the a building.
  1. The isolated loop circuit protector shall be located as close as practicable to the point at which the circuits leave or enter a building.



## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install all fire alarm equipment and wiring in accordance with local and national codes and NFPA 72.
- B. Install all wiring in raceways and all devices in boxes:
  - 1. Install raceways and boxes in accordance with Specification Section 26 05 33.
  - 2. In unfinished areas, exposed fire alarm conduit shall be red in color.
  - 3. All boxes are to be red in color (either painted or a manufacturer's red box).
- C. Install all components as indicated and in accordance with manufacturer's wiring diagrams, instructions and recommendations.
- D. Make all fire alarm wiring continuous from terminal to terminal or from terminal to device pigtail lead.
  - 1. Circuit splices not permitted.
  - 2. Wiring joints, only when required at device pigtail leads shall utilize insulated conical spring connector.
- E. Color coding or other identification is required for all fire alarm wiring.
  - 1. Coordinate requirements with Owner.
- F. Installation of equipment and devices that pertain to other work in contract shall be closely coordinated with appropriate subcontractors.
  - 1. Coordinate 8 IN minimum square access door with rubber gasket in duct approximately 2 FT upstream from smoke detector for testing and servicing.
- G. Detection devices shall be protected during construction as required by NFPA 72.
- H. Device Mounting Schedule:
  - 1. Dimensions are to center of item unless otherwise indicated.
  - 2. Mounting heights as indicated below unless otherwise indicated on the Contract Drawings:
    - a. Manual pull stations (Install per ADA and ADAAG Standards):
      - 1) Forward Reach.
        - a) Unobstructed: Maximum 48 IN.
        - b) Obstructed High Reach (depth less than 20 IN): Maximum 48 IN.
        - c) Obstructed High Reach (depth greater than 20 IN): Maximum 44 IN.
      - 2) Side Reach.
        - a) Unobstructed: Maximum 48 IN.
      - 3) Obstructed High Reach (reach depth less than 10 IN): Maximum 48 IN.
      - 4) Obstructed High Reach (reach depth greater than 10 IN): Maximum 46 IN.
    - b. Notification appliances: Lens is not less than 80 IN and not greater than 96 IN.
    - c. Control panels and remote annunciators: 72 IN to top (display at eye level).

### **3.2 TESTING**

- A. Obtain services of factory trained representative of system manufacturer to supervise installation and its progress, supervise final connections to equipment and provide testing to assure that system is in proper operating condition, and is in compliance with all applicable regulations.
- B. Entire system shall test free from opens, grounds, and short circuits.
- C. Test system to satisfaction of Engineer and state and local fire authorities in accordance with NFPA 72, state and local codes and manufacturer's requirements.
- D. Acceptance Operational Tests:
  - 1. Perform operational system tests to verify conformance with specifications:
    - a. Each alarm initiating device installed shall be operationally tested.
    - b. Each device shall be tested for alarm and trouble conditions.

- c. Fire Alarm Submit written certification that Fire Alarm System installation is complete including all punch-list items.
- d. Test battery operated emergency power supply. Test emergency power supply to minimum durations specified.
- e. Test supervising station signal transmitter. Coordinate testing with supervising station monitoring firm/entity.
- f. Test each notification appliance installed for proper operation. Submit written report indicating sound pressure levels at specified distances.
- g. Test FACU.
- 2. Provide minimum 5 business days notice of acceptance test performance schedule to Owner, and local Authority Having Jurisdiction (AHJ).
- E. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by system test that total system meets Specifications and complies with applicable standards.
- F. Report of Tests and Inspections: Provide written record of inspections, tests, and detailed test results in form of test log. Use NFPA 72 Forms for documentation.
- G. Final Test, Record of Completion, and Certificate of Occupancy:
- H. Test system as required by Authority Having Jurisdiction in order to obtain certificate of occupancy. Provide completed NFPA 72 Record of Completion form to Owner and AHJ.

### **3.3 CLEANING AND ADJUSTING**

- A. Cleaning: Remove paint splatters and other spots, dirt, and debris from all devices and equipment panels. Clean panel internally using methods and materials recommended by manufacturer.
- B. Occupancy Adjustments: When requested within one year of date of substantial completion, provide on-site assistance in adjusting sound pressure levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to site for this purpose.

### **3.4 TRAINING**

- A. Provide services of factory-authorized service representative to demonstrate system and train Owner's personnel in operation of system as specified below.
  - 1. Train Owner's maintenance personnel in procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of system.
  - 2. Provide minimum of 4 HRS training.
  - 3. Schedule training with Owner at least two weeks in advance.
  - 4. Fill out Owner instruction reports.

## **END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.



# DIVISION 40

## PROCESS INTERCONNECTIONS

THIS PAGE INTENTIONALLY LEFT BLANK.

## **SECTION 40 42 00**

### **PIPE, DUCT AND EQUIPMENT INSULATION**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Insulation:
    - a. Piping insulation.
    - b. Duct insulation.
  - 2. Adhesives, mastics, sealants, and finishes.
- B. Related Specification Sections include but are not necessarily limited to:
  - 1. Division 00 - Procurement and Contracting Requirements.
  - 2. Division 01 - General Requirements.

##### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. ASTM International (ASTM):
    - a. C553, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
    - b. C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
    - c. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
  - 2. National Fire Protection Association (NFPA):
    - a. 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.
  - 3. Underwriters Laboratories, Inc. (UL):
    - a. 723, Standard for Test for Surface Burning Characteristics of Building Materials.
  - 4. National Commercial and Industrial Insulation Standards (2013 seventh edition).
    - a. Published by Midwest Insulation Contractors Association (MICA).
    - b. Endorsed by National Insulation Association (NIA).
    - c. MICA plate numbers listed in this specification reference this document.

##### **1.3 SUBMITTALS**

- A. Shop Drawings:
  - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Submit complete specification of insulation materials, adhesives, cement, together with manufacturer's recommended methods of application and coverage for coatings and adhesives.
  - 3. Submit itemized schedule by building of proposed insulation systems showing density, thermal conductivity, thickness, adhesive, jackets and vapor barriers.
  - 4. Certifications: Products will meet the requirements of the Contract Documents.

#### **PART 2 - PRODUCTS**

##### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Elastomeric insulation:

- a. Rubatex.
- b. Armstrong.
- 2. Fiberglass insulation:
  - a. CertainTeed Corporation.
  - b. Johns Manville.
  - c. Owens Corning.
  - d. Knauf.
- 3. PVC jacket:
  - a. Ceel-Co.
  - b. PIC Plastics.
- 4. Ductwork insulation:
  - a. CertainTeed.
  - b. Johns Manville.
  - c. Owens Corning.
- 5. Adhesives, mastics, sealants, and finishes:
  - a. Foster Products.
  - b. Childers.
  - c. Dow Corning.
  - d. Johns Manville.
  - e. Knauf.

## 2.2 PIPING INSULATION - ELASTOMERIC

- A. General:
  - 1. Insulation fire and smoke hazard ratings for composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to the insulation), as tested by procedure ASTM E84, NFPA 255 and UL 723, not exceeding:
    - a. Flame spread: 25.
    - b. Smoke developed: 50.
  - 2. Accessories (adhesives, mastics, cements, and tapes: Same component ratings as listed above.
  - 3. Indicate on product labels or their shipping cartons: Flame and smoke ratings do not exceed above requirements.
  - 4. Permanent treatment of jackets or facings to impart flame and smoke safety is required.
    - a. Water-soluble treatments are prohibited.
  - 5. Insulated shields at pipe support points.
- B. Pipe, Fitting, and Valve Insulation:
  - 1. Flexible elastomeric closed cell pipe insulation.
    - a. Average thermal conductivity not to exceed 0.27 (BTU-IN)/(HR-FT<sup>2</sup>-DEGF) at mean temperature of 75 DEGF, temperature range -40 to 220 DEGF; permeability not to exceed 0.20 by ASTM E96; water absorption 3 PCT by ASTM D1056 and ozone resistance.
  - 2. Provide minimum insulation thickness conforming to schedules or as shown on the Drawings.

## 2.3 PIPING INSULATION - FIBERGLASS

- A. Pipe and Fitting Insulation:
  - 1. Preformed fiberglass pipe insulation:
    - a. Density: 4 LBS/CUFT.
    - b. Temperature rated: 650 DEGF.
    - c. Average thermal conductivity not to exceed 0.23 (BTU-IN)/(HR-FT<sup>2</sup>-DEGF) at mean temperature of 75 DEGF.
    - d. Fire hazard rating:
      - 1) UL 723, ASTM E84, NFPA 255.
      - 2) Flame spread not exceeding 25 and smoke developed not exceeding 50.
  - 2. Moisture adsorption:

- a. ASTM C553.
  - b. Not greater than 5 PCT moisture by volume when exposed to moisture laden air at 120 DEGF and 96 PCT RH.
3. Fungi and bacteria resistance:
  - a. ASTM C665.
  - b. Does not breed or promote growth.
  - c. Flame attenuated glass fibers bonded with thermosetting resin.
4. Piping jackets (general applications):
  - a. Aluminum: 16 MIL embossed aluminum.
  - b. PVC: Preformed 0.028 IN thick PVC jackets fabricated from B.F. Goodrich PVC sheeting V-66 with proven resistance to ultraviolet degradation when temperatures do not exceed the limits of PVC.
  - c. Piping jacket not required on concealed piping.
5. Provide minimum insulation thickness conforming to schedules or as shown on the Drawings.

## **2.4 DUCTWORK INSULATION: FIBERGLASS**

- A. Flexible Insulation:
  1. Material: Commercial-grade fiberglass thermal insulation, formaldehyde free.
  2. Scheduled thickness and installed R-value. Installed R-value when compressed to a maximum of 25 PCT following recommended duct wrap stretch outs.
  3. Factory-applied foil scrim vapor barrier facing.
  4. Average thermal conductivity not to exceed 0.27 (BTU-IN)/(HR-FT<sup>2</sup>-DEGF) at a mean temperature of 75 DEGF (installed).
  5. Fungi and bacteria resistance:
    - a. ASTM C1338.
    - b. Does not breed or promote growth.
  6. Fire hazard classification:
    - a. UL 723, ASTM E84, NFPA 255.
    - b. Flame spread not exceeding 25 and smoke developed not exceeding 50.
  7. Basis of design: Johns Manville Microlite fiberglass duct wrap insulation.
- B. Semi-Rigid Insulation for Indoor Installation:
  1. Scheduled thickness and R-value.
  2. Factory applied vapor barrier facing-white scrim foil.
  3. Average thermal conductivity not to exceed 0.23 (BTU-IN)/(HR-FT<sup>2</sup>-DEGF) at a mean temperature of 75 DEGF.
  4. Fungi and bacteria resistance:
    - a. ASTM C1338.
    - b. Does not breed or promote growth.
  5. Moisture adsorption:
    - a. ASTM C553.
    - b. Not greater than 0.5 PCT moisture by volume when exposed to moisture laden air at 120 DEGF and 96 PCT RH.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. General:
  1. Consider ductwork, piping and equipment as exposed, except as otherwise indicated.
  2. Consider ductwork, piping and equipment in walls, partitions, floors, pipe chases, pipe shafts and duct shafts as concealed.
    - a. Consider ductwork, piping and equipment above ceilings as concealed.
  3. Provide release for insulation application after installation and testing is complete.



- a. Apply insulation on clean, dry surfaces after inspection.
  4. Provide insulation continuous through wall, roof and ceiling openings, pipe hangers, supports and sleeves.
  5. Provide insulation with vapor barrier for piping and ductwork where surfaces may be cooler than surrounding air temperatures.
    - a. Provide vapor barrier (0.17 perm-IN; ASTM C553) continuous and unbroken.
    - b. Hangers, supports, anchors, and related items that are secured directly to cold surfaces must be adequately insulated and vapor-sealed to prevent condensation.
  6. Apply specified adhesives, mastics and coatings at the manufacturer's recommended coverage per unit volume.
- C. Piping Insulation - Elastomeric:
1. Do not insulate until satisfactory completion of required pressure testing.
  2. Apply insulation to clean, dry surfaces.
  3. Slip insulation on pipe prior to connection.
    - a. Whenever the slip-on technique is not possible provide insulation neatly slit and snapped over the pipe.
  4. Fabricate and install fitting cover insulation according to manufacturer's recommendations.
  5. Seal joints, slits, miter-cuts and other exposed edges of insulation with adhesive, recommended by the insulation manufacturer, to ensure complete vapor barrier.
- D. Piping Insulation - Fiberglass:
1. Apply over clean dry pipe.
    - a. Butt all joints together firmly.
  2. Seal joints, slits, miter-cuts and other exposed edges of insulation as recommended by the insulation manufacturer.
  3. Insulate fittings, valves, and flanges with insulation thickness equal to adjacent pipe.
  4. PVC pipe jacket:
    - a. Apply jacketing with a minimum of 1 IN overlap.
      - 1) Weld longitudinal and circumferential seams with adhesives as recommended by manufacturer.
    - b. Provide slip-joints every 30 FT and between fittings if distance exceeds 8 FT.
      - 1) Construct slip-joints by overlapping jacket sections 6 to 10 IN.
    - c. Provide pre-molded PVC covers of same material and manufacturer as jacket for fittings, valves, flanges, and related items in insulated piping systems.
  5. Aluminum pipe jacket:
    - a. Field-applied aluminum jacket with vapor-sealed longitudinal and butt joints.
    - b. Provide smooth and straight joint with a minimum 2 IN overlap.
    - c. Secure joints with corrosion-resistant screws spaced 0.25 to 0.50 IN back from edge.
    - d. Center spacing of screws 5 IN maximum or as required to provide smooth tight-fitted joints.
    - e. Place joints on least exposed side of piping to obtain neat appearance.
- E. Ductwork Insulation - Fiberglass:
1. Flexible insulation:
    - a. Butt edges tightly.
      - 1) Secure insulation with Benjamin Foster 85-20 adhesive applied in 6 IN strips on 12 IN centers and/or pins, applied on not more than 18 IN centers so that the insulation conforms to the duct surfaces uniformly and firmly.
    - b. Seal joints with facing overlap or 4 IN wide strips of like facing material adhered and stapled in place.
    - c. Properly seal any penetration in vapor barrier facing with Benjamin Foster 85-20.
    - d. Cut insulation slightly longer than the perimeter of the duct to ensure full thickness at corners.
  2. Semi-rigid insulation and duct interior lining board:
    - a. Impaling over pins.
      - 1) Apply insulation with edges tightly butted.

- 2) Apply insulation with mechanically welded fasteners to the duct and secured with speed clips.
- 3) Clip pins off close to clip.
- 4) Space pins as required to hold insulation firmly against duct surface but not less than one pin per 1.5 SQFT.
- 5) Seal joints and speed clips with 3 IN wide strip of facing adhered with Benjamin Foster 85-20 adhesive.
- b. If the welded pin method is impossible, secure insulation to the duct with Benjamin Foster 85-20 adhesive.
  - 1) Cover the entire surface of duct with adhesive.
  - 2) Use corner metal angle to protect edge of insulation.
  - 3) Protect edge of insulation.
  - 4) Seal joints as above.
- c. For outdoor application finish with Benjamin Foster #4610 weatherproof mastic with white glass fabric membrane.

### 3.2 REPAIR

- A. Whenever any factory applied insulation or job-applied insulation is removed or damaged, replace with the same quality of material and workmanship.

### 3.3 SCHEDULES

- A. Refrigeration Lines (35-60 DEGF):
1. Elastomeric.
  2. 1/2 IN thickness for lines 1 IN and smaller.
- B. Pipe, Fittings and Valves:
1. Fiberglass.

APPLICATION	PIPE SIZE	THICKNESS	JACKET
ROOF DRAINAGE	2-1/2 to 6 IN	1/2 IN	PVC
Cold Water (domestic)	All sizes	1 IN	PVC
Condensate Vent	2 IN and less	1 IN	PVC
	2-1/2 IN to 6 IN	1-1/2 IN	

- C. Ductwork:
1. Fiberglass.

DUCT SERVICE	INSULATION AND THICKNESS	MINIMUM R-VALUE (HR-FT <sup>2</sup> -DEGF)/BTU
Outside air ducts connected to AHUs, inside building	2-1/2 IN semi-rigid with vapor barrier	12.0
Supply and return air ducts connected to AHUs	2 IN flexible with vapor barrier	6.0
All other ductwork	Uninsulated	N/A

**END OF SECTION**

THIS PAGE INTENTIONALLY LEFT BLANK.

## Item F-162 Chain-Link Fence

### DESCRIPTION

**162-1.1** This item shall consist of furnishing and erecting a chain-link fence in accordance with these specifications, the details shown on the plans, and in conformity with the lines and grades shown on the plans or established by the RPR.

### MATERIALS

**162-2.1 Fabric.** The fabric shall be woven with a 9-gauge aluminum wire in a 2-inch (50 mm) mesh and shall meet the requirements of ASTM F1183. The fabric shall be woven from a 9 gauge aluminum-coated steel wire in a 2-inch (50 mm) mesh and shall conform to the requirements of ASTM A491.

**162-2.2 Barbed wire.** Barbed wire shall be  $\geq$  3-strand 12-1/2 gauge zinc-coated wire with 4-point barbs and shall conform to the requirements of ASTM A121, Class 3, Chain Link Fence Grade.

**162-2.3 Posts, rails, and braces.** Line posts, rails, and braces shall conform to the requirements of ASTM F1043 or ASTM F1083 as follows:

- Galvanized tubular steel pipe shall conform to the requirements of Group IA, (Schedule 40) coatings conforming to Type A, or Group IC (High Strength Pipe), External coating Type B, and internal coating Type B or D.
- Roll Formed Steel Shapes (C-Sections) shall conform to the requirements of Group IIA, and be galvanized in accordance with the requirements of ASTM F1043, Type A.
- Hot-Rolled Shapes (H Beams) shall meet the requirements of Group III, and be galvanized in accordance with the requirements of ASTM F1043, Type A.
- Aluminum Pipe shall conform to the requirements of Group IB.
- Aluminum Shapes shall conform to the requirements of Group IIB.
- Vinyl or polyester coated steel shall conform to the requirements of ASTM F1043, Paragraph 7.3, Optional Supplemental Color Coating.
- Composite posts shall conform to the strength requirements of ASTM F1043 or ASTM F1083. The strength loss of composite posts shall not exceed 10% when subjected to 3,600 hours of exposure to light and water in accordance with ASTM G152, ASTM G153, ASTM G154, and ASTM G155.
- Posts, rails, and braces furnished for use in conjunction with aluminum alloy fabric shall be aluminum alloy or composite.

Posts, rails, and braces, with the exception of galvanized steel conforming to ASTM F1043 or ASTM F1083, Group 1A, Type A, or aluminum alloy, shall demonstrate the ability to withstand testing in salt spray in accordance with ASTM B117 as follows:

- External: 1,000 hours with a maximum of 5% red rust.
- Internal: 650 hours with a maximum of 5% red rust.

The dimensions of the posts, rails, and braces shall be in accordance with Tables I through VI of Federal Specification RR-F-191/3.

**162-2.4 Gates.** Gate frames shall consist of galvanized steel and shall conform to the specifications for the same material under paragraph 162-2.3. The fabric shall be of the same type material as used in the fence.

**162-2.5 Wire ties and tension wires.** Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type. Tension wire shall be 7-gauge marcelled steel wire with the same coating as the fabric type and shall conform to ASTM A824.

All material shall conform to Federal Specification RR-F-191/4.

**162-2.6 Miscellaneous fittings and hardware.** Miscellaneous steel fittings and hardware for use with zinc-coated steel fabric shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric posts, and wires of the quality specified herein. All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A153. Barbed wire support arms shall withstand a load of 250 pounds (113 kg) applied vertically to the outermost end of the arm.

**162-2.7 Concrete.** Concrete shall have a minimum 28-day compressive strength of 3000 psi (2670 kPa).

**162-2.8 Marking.** Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and kind of coating.

## CONSTRUCTION METHODS

**162-3.1 General.** The fence shall be constructed in accordance with the details on the plans and as specified here using new materials. All work shall be performed in a workmanlike manner satisfactory to the RPR. The Contractor shall layout the fence line based on the plans. The Contractor shall span the opening below the fence with barbed wire at all locations where it is not practical to conform the fence to the general contour of the ground surface because of natural or manmade features such as drainage ditches. The new fence shall be permanently tied to the terminals of existing fences as shown on the plans. The Contractor shall stake down the woven wire fence at several points between posts as shown on the plans.

The Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet (90 m). The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence.

**162-3.2 Clearing fence line.** Clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions that will interfere with proper construction of the fence. Stumps within the cleared area of the fence shall be grubbed or excavated. The bottom of the fence shall be placed a uniform distance above ground, as specified in the plans. When shown on the plans or as directed by the RPR, the existing fences which interfere with the new fence location shall be removed by the Contractor as a part of the construction work unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other suitable material and compacted with tampers.

The cost of removing and disposing of the material shall not constitute a pay item and shall be considered incidental to fence construction.

**162-3.3 Installing posts.** All posts shall be set in concrete at the required dimension and depth and at the spacing shown on the plans.

The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within seven (7) days after the individual post footing is completed.

Should rock be encountered at a depth less than the planned footing depth, a hole 2 inches (50 mm) larger than the greatest dimension of the posts shall be drilled to a depth of 12 inches (300 mm). After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above.

In lieu of drilling, the rock may be excavated to the required footing depth. No extra compensation shall be made for rock excavation.

**162-3.4 Installing top rails.** The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.

**162-3.5 Installing braces.** Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.

**162-3.6 Installing fabric.** The wire fabric shall be firmly attached to the posts and braced as shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than one inch (25 mm) or more than 4 inches (100 mm) from the ground surface. Grading shall be performed where necessary to provide a neat appearance.

At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches (150 mm) or less.

**162-3.7 Electrical grounds.** Electrical grounds shall be constructed at 500 feet (150 m) intervals. The ground shall be accomplished with a copper clad rod 8 feet (2.4 m) long and a minimum of 5/8 inches (16 mm) in diameter driven vertically until the top is 6 inches (150 mm) below the ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction. The Contractor shall comply with FAA-STD-019, Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment, paragraph 4.2.3.8, Lightning Protection for Fences and Gates, when fencing is adjacent to FAA facilities.

**162-3.8 Cleaning up.** The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction. All disturbed areas shall be seeded ~~per T-901~~.

## METHOD OF MEASUREMENT

**162-4.1** Chain-link fence will be measured for payment by *the complete installation of the fence per the details shown on the plans and shall be lump sum.* ~~the linear foot (meter).~~ Measurement will be along the top of the fence from center to center of end posts, excluding the length occupied by gate openings.

**162-4.2** Gates will be measured as *lump sum.* ~~complete units.~~

### BASIS OF PAYMENT

**162-5.1** Payment for chain-link fence will be made at *lump sum for the installation and shall be included in the total project cost.* ~~the contract unit price per linear foot (meter).~~

**162-5.2** Payment for vehicle or pedestrian gates will be made at *lump sum for the installation and shall be included in the total project cost.* ~~the contract unit price for each gate.~~

The price shall be full compensation for furnishing all materials, and for all preparation, erection, and installation of these materials, and for all labor equipment, tools, and incidentals necessary to complete the item.

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ASTM International (ASTM)

ASTM A121	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A392	Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A491	Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A824	Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM F668	Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and other Organic Polymer Coated Steel Chain-Link Fence Fabric
ASTM F1043	Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
ASTM F1083	Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F1183	Standard Specification for Aluminum Alloy Chain Link Fence Fabric
ASTM F1345	Standard Specification for Zinc 5% Aluminum-Mischmetal Alloy Coated Steel Chain-Link Fence Fabric
ASTM G152	Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G153	Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
ASTM G155	Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

Federal Specifications (FED SPEC)

FED SPEC RR-F-191/3 Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)

FED SPEC RR-F-191/4 Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

FAA Standard

FAA-STD-019 Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment

FAA Orders

5300.38 AIP Handbook

**END OF ITEM F-162**



## **Item S-101 Project Survey**

### **DESCRIPTION**

**101-1.1** Under this item, the Contractor shall do all necessary surveying and project stakeout required to construct all elements of the Project as shown on the Contract Drawings and specified in the Specifications. This shall include but not be limited to stakeout, layout and elevations for pavements, structures, forms and appurtenances as shown and required consistent with the current practices and shall be performed by a State of Florida licensed professional land surveyor. The stakeout survey shall proceed immediately following the Notice to Proceed or as soon as authorized by the Owner in accordance with the phasing of the construction and shall be expeditiously progressed to completion in a manner and at a rate satisfactory of the Owner. The Contractor shall keep the Resident Project Representative (RPR) fully informed as to the progress of the stakeout survey. All survey work shall be provided under the direction of a State of Florida licensed professional land surveyor.

### **MATERIALS**

**101-2.1** All instruments, equipment, stakes and any other material necessary to perform the work satisfactorily shall be provided by the Contractor. It shall be the Contractor's responsibility to maintain these stakes in their proper position and location at all times.

### **CONSTRUCTION METHODS**

**101-3.1** The Contractor shall trim trees, brush, roots and other interfering objects from survey lines in advance of all survey work to permit accurate and unimpeded work by his stakeout survey crews.

The exact position of all work shall be established from control points, baseline transit points or other points of similar nature which are shown on the Contract Drawings and/or modified by the Engineer. Prior to any layout of works to be constructed, the Contractor shall verify the location and accuracy of all control points provided in the plans. Any error, apparent discrepancy or absence in or of data shown or required for accurately accomplishing the stakeout survey shall be referred to the RPR and Engineer for interpretation or furnishing when such is observed or required.

The Contractor shall place two offset stakes or references at each centerline full and half station and at such intermediate locations as the RPR may direct. From computations and measurements made by the Contractor, these stakes shall be clearly and legibly marked with the correct centerline full and half station number, offset and cut or fill so as to permit the establishment of the exact centerline location and elevation during construction. If markings become faded or blurred for any reason, the markings shall be restored by the Contractor at the request of the RPR. He shall locate and place all cut, fill, slope, fine grade or other stakes and points, as the engineer may direct, for the proper progress of the work. All control points shall be properly guarded and flagged for easy identification.

Drainage structures shall be staked out by the Contractor at the locations and elevations shown on the Contract Drawings or specified by the Engineer through the RPR.

Reference points, baselines, stakes and benchmarks for stockpiles shall be established by the Contractor.

The Contractor shall be responsible for the accuracy of his work and shall maintain all reference points, stakes, etc., throughout the life of the Contract. Damaged or destroyed points, benchmarks or stakes, or any reference points made inaccessible by the progress of the construction, shall be replaced or transferred by the Contractor. Any of the above points which may be destroyed or damaged shall be transferred by the Contractor before they are damaged or destroyed. All control points shall be referenced by ties to acceptable objects and recorded. Any alterations or revisions in the ties shall be so noted and the information furnished to the RPR immediately. All stakeout survey work shall be referenced to the centerlines shown on the Contract Drawings. All computations necessary to establish the exact position of the work from control points shall be made and preserved by the Contractor. All computations, survey notes and other records shall be made available to the RPR upon request and shall become the property of the Owner.

The Contractor shall furnish, at his expense, all horizontal and vertical control, all staking and layout of construction work called for on the plans. The RPR, Engineer, and Owner shall not be responsible for such work. However, the Owner and Engineer reserve the right to check all said lines, grades, and measurements with their appointed surveyor. Should the Owner's surveyor detect errors in said lines, grades, and measurements, the contractor shall pay for all said surveying costs and subsequent surveying costs performed to verify correction of errors found in said lines, grades and measurements. Definition of an error shall be a discrepancy of  $\frac{1}{4}$ " or more. In the case of a discrepancy between the technical specifications and this defined tolerance, the more severe tolerance shall govern.

During the progress of the construction work, the Contractor will be required to furnish all of the surveying and stakeout incidental to the proper location by line and grade for each phase of the work. For paving and any other operation requiring extreme accuracy, the Contractor will re-stake with pins or other acceptable hubs located directly adjacent to the work at a spacing directed by the RPR.

Any existing stakes, iron pins, survey monuments or other markers defining property lines which may be disturbed during construction shall be properly tied into fixed reference points before being disturbed and accurately reset in their proper position upon completion of the work.

Just prior to completion of the Contract, the Contractor shall reestablish, if necessary, and retie all control points as permanently as possible and to the satisfaction of the RPR.

**101-3.2 SURVEY REFERENCE POINTS.** Establish, maintain and protect survey control points prior to starting work, using base reference points as shown on Plans. Promptly notify RPR, Engineer, and Owner of any discrepancies discovered.

Promptly report to RPR the loss or destruction of any reference point or relocation required because of changes in grades or other reasons. Replace dislocated survey control points based on original survey control.

**101-3.3 SURVEYS FOR MEASUREMENT AND PAYMENT.** Contractor shall submit progress surveys in .dwg format for subgrade, sub-base, base, pavement course prior to acceptance of payment per CADD requirements provided in section 101-4.

**101-3.4 AS-BUILT SURVEY.** Upon completion of the work, after Substantial Completion and before Final Acceptance, the Contractor shall supply to the RPR a complete as-built survey of the entire project site including drainage structures and utilities. All survey points, including horizontal and vertical control, property corners, section corner and reference (hereinafter referred to as "survey point") shall be clearly marked and referenced prior to construction. These survey points must be sufficiently referenced so that they can be reestablished after construction if they are disturbed. All survey data shall be in the same horizontal and vertical datum as the contract documents.

This as-built survey will be a complete topographic and physical features survey of the entire project site surrounded by the limits of construction plus an additional 10' beyond the limits of construction in all

directions. Elevations shall be obtained on all rigid pavement joint intersections and ends. If any work is done outside the limits of construction for any reason, this limit of survey will be increased to include this area plus 25'. This survey shall be certified by a Florida Licensed Professional Land Surveyor as meeting the minimum Technical Standards for topographic surveys as set forth in chapter 5J-17, Florida Administrative Code. The survey data must be supplied as a signed and sealed drawing (24" x 36" maximum size) at a scale matching the scale of the plans and be electronically submitted in AutoCAD .dwg format on a flash drive per requirements stated in section 101-4. Signed and sealed copies of all field notes, sketches and calculations must be submitted concurrently with the as-built survey. Larger scale details shall be provided to clarify any complicated or complex areas.

The as-built survey is to be supplied to the RPR for review and approval not more than thirty (30) calendar days after substantial completion for the project has been given. If the acceptable as-built survey is not supplied within the required time, the Owner reserves the right to perform the required survey and bill the Contractor for this work.

The as-built survey shall include all information needed to complete all project permit (i.e. SFWMD, etc. ...) as required by the permits and/or agencies standard requirements. A minimum of six (6) signed and sealed copies of the as-built survey will be supplied to the Engineer and RPR. One digitally signed/sealed copy will be supplied.

### **CADD SURVEY DELIVERABLE REQUIREMENTS**

**101-4.1 DIGITAL SURVEY DELIVERABLE REQUIREMENTS.** Unless specifically directed by the engineer, the following specifications shall be applied for all digital survey deliverables to the Engineer that are to be utilized for construction as-builts.

**101-4.2 DRAWING COORDINATE SYSTEM.** The drawing file is to be in model space utilizing the coordinate system and vertical datum of the contract documents. A separate document should also be supplied with any combined site scale factor and origin needed to convert coordinates from ground to grid if applicable.

**101-4.3 PROPERTIES AND DRAWING ENTITIES.** Electronic survey to be delivered in AutoCAD Civil 3D release 2020 format or other approved format. The drawing shall be layered in accordance with Owner CAD Standards. National CAD Standards (NCS) shall be met if Owner CAD Standards do not exist. An AutoCAD template file containing layers can be requested by the Contractor to the Engineer.

Separate layer names should be used for all distinct objects surveyed. Do not group dis-similar items together on the same layer. For example, do not place line work and annotation on the same layer. All properties of the AutoCAD entities in the drawing are to be BYLAYER (Absolutely No Exceptions Here). In other words, do not change the properties of individual entities. For example, do not place water items on the sanitary layer and just change the color, linetype, or lineweight of the entity. Any user defined blocks used in the drawing shall have all entities created on layer 0, and all other properties shall be set to BYLAYER.

All blocks, dimensions, mtext, mleaders used in the drawing will use the Annotative property wherever possible. An exception to this will be blocks used as point symbols. These blocks cannot have an annotative property. Points shall not be used to depict physical features. Features shall be depicted using blocks or linework. Points shall only be used for topographic information.

**101-4.4 SURFACES.** Creating an accurate existing surface model is critical to the overall design process. An accurate model extends past the requirements for the given contour interval stated by the Master Services Agreement. It is the intention of this model to be generated with breaklines. There must be breaklines at all breaks in grade along the site. This should include but not limited to ALL Tops, Toes,

Swales, Crowns, Flow Lines, Face/Back of Curbs, Edge of Pavement and any other linear features. A surface given without breaklines will be a cause for immediate rejection and delay the project schedule.

Surfaces created with Civil 3D shall be created from Survey Points and 3D break lines (with preference to the use of Feature Lines) at a minimum. In the event the number of collected points exceeds 20,000, an external point file may be used for natural ground or spot shots. The external file shall be a separate comma delimited ASCII point file in PNEZD (Point Number, Northing, Easting, Elevation, and Description) format. The point file should then be linked to the existing ground surface and a note placed in the description of the surface giving the external file name.

Surfaces created from other software programs should include Survey Points and 3D Breaklines at a minimum. The drawing should include polylines representing contours, 3D Lines or 3D Faces representing the surface model.

**104-4.5 SURVEY OBJECTS.** Survey Figures should NOT be used in the drawing for 2D line work.

### **METHOD OF MEASUREMENT**

**101-5.1** No separate measurement for payment shall be made for Project Survey and shall be considered incidental to the project items.

**END OF ITEM S-101**

**ITEM S-102 HIGH PERFORMANCE TURF REINFORCEMENT MAT****DESCRIPTION**

**102-1.1** This item shall consist of preparing the ground surface and the installation of the high performance turf reinforcement mat (HPTRM) and associated with the installation of HPTRM, which includes all associated appurtenance shown in the on the contract documents at the locations shown on the plans or as directed by the ENGINEER.

**SUBMITTALS**

**102-3.1 General.** Submit each item in this article according to the conditions of the Contract and Division 01 Specification Sections.

**102-3.2 Quality Assurance Documents.** The CONTRACTOR shall submit all quality assurance for approval.

**102-3.3** Upon execution of contract, the CONTRACTOR shall submit the following:

**105-3.3a.** The CONTRACTOR shall submit, in booklet form, the MANUFACTURER's literature for the product used on the job. The CONTRACTOR shall also submit the MANUFACTURER's ISO 9001 certification or state their quality control is in accordance with ASTM D4354.

**105-3.3b.** The CONTRACTOR shall provide a certificate from a Geosynthetic Accreditation Institute Laboratory Accreditation Program (GAI-LAP) lab stating the name of the HPTRM MANUFACTURER, product name, style, chemical compositions of filaments yarns, and other pertinent information to fully describe the HPTRM.

**105-3.3c.** The CONTRACTOR shall submit Shop Drawings including the MANUFACTURER's installation plan to the DISTRICT for approval prior to delivery of the HPTRM to the jobsite. Nontraditional construction methods may be required to perform the installation of HPTRM.

**105-3.3d.** Prior to placement of the HPTRM, the CONTRACTOR shall notify the DISTRICT who will inspect the soil surfaces for conformance.

**105-3.3e.** Anchor Load Tests: The CONTRACTOR shall submit earth percussion anchor pullout test reports testing the minimum required pullout resistance as stated in this specification. Load tests shall be performed for every 100 linear feet of embankment on each canal bank installed.

**102-3.4** Prior to placing sod over the HPTRM, the CONTRACTOR shall submit the following:

**105-3.5a.** Submit as-built drawings of completed work in accordance with requirements of the specification as indicated in Specification S-101. As-built drawings are required to indicate the limits of the installed HPTRM.



## MATERIALS

**102-4.1 High Performance Turf Reinforcement Mat (HPTRM).** The contractor shall furnish a HPTRM manufactured for the purpose of protecting the areas shown in the plans from erosion. The HPTRM shall be made of 100% UV-stabilized polypropylene and contain no biodegradable components or materials to ensure long term design life. The HPTRM shall be composed of a three dimensional matrix, that will maintain its three dimensional stability without laminated or stitched layers. The HPTRM shall not lose its structural integrity, and shall not unravel or separate when it is cut in the field. The following attributes differentiate a HPTRM:

The mat shall meet the following requirements: (range, minimum, or maximum)

Property	Test Method	Test Parameter	Units	Property Requirement
Thickness	ASTM D6525	Range	mm	6.4 – 12.7
Resiliency	ASTM D6524	Minimum	percent	70
Mass Per Unit Area	ASTM D6566	Range	g/m <sup>2</sup>	270 - 505
Ultimate Tensile Strength	ASTM D6818	Minimum	kN/m (lbs/ft)	43.8x 43.8 (3,000 x 3,000)
Tensile Elongation	ASTM D6818	Maximum	percent	65
Light Penetration	ASTM D6567	Minimum	percent	10
UV Resistance	ASTM D4355	Minimum	percent	80 @3000 hrs

### 102-4.2 Anchoring Devices

**102-4.2a Pins.** The CONTRACTOR shall furnish metal pins with a minimum length of 18 inches with a steel washer located at the head of the pin. The metal pins provide for temporary tie down of the HPTRM to the slope in the locations specified to aid with vegetation establishment. Locations of the pins along the top anchor trench are indicated in the Contract Drawings. Locations of the pins along the vertical overlaps are spaced one (1) foot apart except for where an earth percussion anchor is located. Pin pattern throughout slope face shall be as shown in the Contract Drawings.

#### PHYSICAL PROPERTIES

Component	Physical Properties
Metal Pin	0.2 in diameter steel
Metal Washer	in. diameter

### 102-4.2b Earth Percussion Anchors.



- a. The CONTRACTOR shall furnish earth percussion anchors with minimum drive depths of 36 inches and minimum pullout resistance of 300 lbs for permanent tie down of the HPTRM to the slope in the locations specified in the Contract Drawings.
- b. Percussion anchors shall be placed in a grid pattern throughout the HPTRM at no more than four (4) feet spacing between anchors. Percussion anchor spacing shall include anchors along top and bottom trenches, along each side in the overlap areas and at ends of HPTRM.
- c. The earth percussion anchor components shall be made of materials suitable to resist corrosion and UV degradation particularly at the soil/ air interface. The anchor head shall have relatively smooth edges to minimize abrasion and installation damage to the HPTRM. The anchor shall consist of a self-setting wedge grip used to lock and hold the loading applied to an anchor. The anchor shall reside at a minimum depth of 36 inches after it is locked in place.

### MATERIAL STORAGE AND HANDLING

**102-5.1 Storage.** Prior to use, the CONTRACTOR shall store the HPTRM in a clean, dry place, out of direct sunlight, not subject to extremes of either hot or cold and with the manufacturer's protective cover in place. Receiving, storage, and handling at the job site shall be in accordance with the requirements in ASTM D4873.

### CONSTRUCTION METHODS

**102-6.1 Surface Preparation.** The CONTRACTOR shall grade surface on which the HPTRM is to be placed to the neat lines and grades as shown on the Contract Drawings. The surface shall be smooth and free of loose rocks, clods, holes, depressions, projections, muddy conditions, and standing or flowing water. Any irregularities shall be removed so as to insure continuous, intimate contact of the HPTRM with the surface.

**102-6.2 Construction Methods.** The CONTRACTOR shall place the HPTRM in accordance with the MANUFACTURER's recommendations and the following requirements:

**102-6.3 Inspection and tests.** The CONTRACTOR shall provide access to the WORK for the ENGINEER as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice to the ENGINEER of its intention to begin new WORK activities. Inspections shall be conducted by the ENGINEER for the following portions of the installation of the HPTRM:

- a. Install the HPTRM at elevation and alignment indicated in the Contract Drawings in accordance with the approved installation plan.
- b. Secure the HPTRM into the bottom anchor trench below the water line at the elevation indicated in the Contract Drawings, ensuring that the HPTRM is permanently anchored with earth percussion anchors spaced 4-feet apart, in between lapped ends and at the lapped ends, whichever is less.
- c. Unroll HPTRM up the slope, overlapping adjacent rolls a minimum of six (6) inches (unless otherwise specified by the MANUFACTURER). The HPTRM shall be unrolled along the placement area and loosely laid (not stretched) in such a manner so that it will conform to the placed on or against underlying soils. The upstream HPTRM shall overlap the abutting downstream HPTRM so to shingle panels of the HPTRM in such a manner that works with the flow of water in the canal to reduce undermining of the HPTRM at vertical overlaps. Horizontal overlaps are not permitted.



- d. Extend the HPTRM to an elevation one (1) foot below the crest or berm and two (2) feet into the embankment, secure into the top anchor trench with pins spaced one (1) foot apart per MANUFACTURE's installation guidelines. Backfill the top anchor trench with soil material and compact according to Compaction Requirements under Item P-152 Excavation, Subgrade and Embankment.
- e. Secure the HPTRM to the slope with pins installed in a pattern of 1.5 pins per square yard or per MANUFACTURER's installation guidelines, whichever is more stringent. Vertical overlaps must be secured using earth percussion anchors starting at the bottom anchor trench and installed every four (4) feet with two (2) feet long pins spaced one (1) foot apart from and between the percussion anchors to the top anchor trench. Increased anchoring frequency may be required if Site conditions are such that the ENGINEER determines it necessary.
- f. Alternate installation methods must be approved by the ENGINEER prior to execution.
- g. Should the HPTRM be torn or punctured, or the overlaps or sewn joint disturbed, as evidenced by visible fabric damage, subgrade pumping, intrusion, or grade distortion, the backfill around the damaged or displaced area shall be removed and restored to the original approved condition. The repair shall consist of a patch of the same type of HPTRM being used, overlaying the existing HPTRM. HPTRM panels joined by overlap shall have the patch extend a minimum of two (2) feet from the edge of any damaged area.
- h. The earth percussion anchors shall have a minimum pullout resistance of 300 lbs and shall be tested at random locations identified by the ENGINEER in accordance with the **Inspection and tests** under this specification item.
- i. Place sod after written approval from the ENGINEER. Sod to be installed and maintained in accordance with FDOT Standard Specification for Grassing and Sodding Materials. Sod may require extra time to take root through HPTRM, CONTRACTOR shall account for the extra time as part of their maintenance activities.
- j. CONTRACTOR shall account for all material thicknesses to ensure all finished grade elevations between areas with HPTRM, sod and other slope protection materials are flush against each other and no irregular surface conditions are present at the final grade elevations.

**102-6.4 Inspection and tests.** The CONTRACTOR shall provide access to the WORK for the ENGINEER as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice to the ENGINEER of its intention to begin new WORK activities. Inspections shall be conducted by the ENGINEER for the following portions of the installation of the HPTRM:

- a. The ENGINEER shall inspect the final grading of the slopes for which the CONTRACTOR proposes to install HPTRM to ensure that it meets the requirements of the contract documents. If a rainfall event occurs that damages the final grading of the canal bank during the HPTRM installation process, the ENGINEER must be present to approve further installation of the HPTRM.
- b. The ENGINEER shall inspect the top anchor trench to ensure that the proper geometry is achieved and that pins are provided at the design interval per the plans prior to backfilling the top anchor trench.
- c. The CONTRACTOR shall conduct random pull out tests of the earth percussion anchors. The earth percussion anchors shall have a pullout resistance of 300 lbs and shall be tested at random locations identified by the ENGINEER in accordance with ASTM D 4435. At a minimum, one (1) pull out test shall be conducted per 100 linear feet of installed HPTRM. The CONTRACTOR shall replace all failed percussion anchors at no additional cost to the





ENGINEER. Replacement anchors shall be installed to a depth sufficient to meet minimum required pullout resistance.

- d. Prior to the installation of sod on the HPTRM, the ENGINEER shall inspect the following:
- (1) There are no surface irregularities or damage that could present a potential failure in the system.
  - (2) All pins and earth percussion anchors are installed per these contract documents.
  - (3) All excess tendons from installed earth percussion anchors are removed.

### METHOD OF MEASUREMENT

**102-6.5** This item shall be measured for payment by the complete installation of the HPTRM per the details shown on the plans and this specification. The cost for pins, anchors, trenches, overlaps, pullout testing, and all other incidentals of this work item shall be included in the lump sum cost.

**102-6.6** Sod and all other incidentals to the sodding installation to be measured as lump sum and shall be included in the total project cost.

### BASIS OF PAYMENT

**102-7.1** Payment for HPTRM will be made at lump sum for the installation and shall be included in the Base Bid Exterior Improvements line item cost, including all incidentals necessary to satisfactorily complete the items as specified.

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- a) American Society for Testing and Materials (ASTM):

ASTM D123	Standard Terminology Relating to Geotextiles
ASTM D276	Standard Test Method for Identification of Fibers in Textiles
ASTM D 3786	Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics
ASTM D4354	Practice for Sampling of Geosynthetics for Testing.
ASTM D4355	Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
ASTM D4435	Standard Test Method for Rock Bolt Anchor Pull Test
ASTM D4439	Standard Terminology for Geosynthetics.
ASTM D4491	Test Method for Water Permeability of Geotextiles by Permittivity.
ASTM D4533	Test Method for Index Trapezoid Tearing Strength of Geotextiles.
ASTM D4595	Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D4632	Test Method for Grab Breaking Load and Elongation of Geotextiles.



ASTM D4759	Practice for Determining the Specification Conformance of Geosynthetics.
ASTM D4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
ASTM D4873	Guide for Identification, Storage, and Handling of Geotextiles.
ASTM D4873	Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D6818	Test Method for Ultimate Tensile Properties of Turf Reinforcement Mats

- b) Geosynthetic Accreditation Institute (GAI) – Laboratory Accreditation Program (LAP)

**END OF ITEM S-102**



# APPENDIX A – GEOTECHNICAL REPORT



# GEOTECHNICAL MATERIAL TESTING INSPECTION SERVICES

February 16, 2019

HDR, Inc.  
3250 W. Commercial Blvd., Suite 100  
Fort Lauderdale, FL 33309  
Attn: Mr. Joe Sawmiller, PE  
email: [Joe.Sawmiller@hdrinc.com](mailto:Joe.Sawmiller@hdrinc.com)

RE: **Geotechnical Services Report  
FXE AES Facility Expansion  
Broward County, Florida  
TSF Project No.: 7111-18-488**

Dear Joe,

Tierra South Florida, Inc. (TSF) has completed a geotechnical exploration and laboratory testing for the subject project. The project is performed in general accordance with Advisory Circular AC150/5320-6F. The results of our exploration program are presented in this report.

If you have any questions or comments regarding this report, please contact our office at your earliest convenience.

Sincerely,

**TIERRA SOUTH FLORIDA, INC.**

Harmon C. Bennett, P.E.  
Principal Engineer  
FL Reg. No. 53130

Ramakumar Vedula, P.E.  
Principal Engineer  
FL Reg No. 54873



THIS DOCUMENT HAS BEEN DIGITALLY  
SIGNED AND SEALED BY:

PRINTED COPIES OF THIS DOCUMENT ARE  
NOT CONSIDERED SIGNED AND SEALED.  
THE SIGNATURE MUST BE VERIFIED  
ON THE ELECTRONIC DOCUMENTS.

TIERRA SOUTH FLORIDA, INC  
2765 VISTA PARKWAY S-30  
WEST PALM BEACH, FL 33411  
CERTIFICATE OF AUTHORIZATION 28073  
HARMON C. BENNETT, P.E.No.53130

# Table of Contents

	<b>Page #</b>
1.0 PROJECT DESCRIPTION.....	1
2.0 SCOPE OF SERVICES .....	1
3.0 RESULTS OF SUBSURFACE EXPLORATION .....	2
3.1 Review of USDA Soil Survey, Broward County, Florida .....	2
3.2 Field Exploration .....	2
3.3 General Soil Condition .....	2
3.4 Pavement Cores .....	3
3.5 Groundwater Conditions.....	3
3.6 Limerock Bearing Ratio (LBR) Tests.....	4
3.8 Laboratory Test Results.....	4
4.0 EVALUATION AND RECOMMENDATIONS .....	5
4.1 Geotechnical Discussion.....	5
4.2 Site Preparation .....	5
4.3 Foundation Recommendations .....	6
4.4 Floor Slab Recommendations.....	7
4.5 Utilities .....	7
5.0 PAVEMENT RECOMMENDATIONS .....	7
6.0 CONSTRUCTION CONSIDERATIONS .....	9
6.1 Excavations .....	9
7.0 LIMITATIONS.....	10

<b>APPENDIX :</b>	A	USDA-NRCS Soil Map
	B	Pavement Core Data Pavement Core Photographic Documentation
	C	Summary of Laboratory Tests Results Summary report of Moisture Density Relationship-LBR-FM5-515 Report of Moisture Density Relationship-LBR-FM5-515
	D	Boring Location Plan, Sheet 1 Soil Profiles, Sheets 2 and 3

## **1.0 PROJECT DESCRIPTION**

The project, as we understand it, includes expansion and improvements to Fort Lauderdale Airport (FXE) Aviation and Service (AES) Facility, in Broward County, Florida.

The following items are considered for the project:

- New Structure for Expansion
- New Roadway and Access Gate
- New Gate for Existing Roadway Access
- New Covered Walkway Between AES and Admin Building
- Expanded Ramp Area
- Asphalt Data for Resurface Existing Roadway and Ramp Area

The purpose of this study was to provide geotechnical input to the design team preparing plans for the planned construction.

## **2.0 SCOPE OF SERVICES**

The study was performed to obtain information on the existing subsurface conditions at the proposed project site to assist in the design of construction plans for the proposed construction. The following services were provided:

1. Reviewed readily available published soils information. This information was obtained from the "Soil Survey of Broward County, Florida" published by the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS).
2. Performed a Geotechnical field study which included fifteen (15) Standard Penetration Test (SPT) borings to an approximate depth of 10 to 20 feet below the existing ground surface. Pavement cores were performed at four (4) of the SPT boring locations. The boring and pavement core locations were provided by representatives of HDR, Inc.
3. Classified soil samples using the ASTM Soil Classification System.
4. Performed limited laboratory testing on selected soil samples, including two (2) tests for: grain size analysis, natural moisture content and organic content test.
5. Performed three (3) laboratory LBR tests- FM5- 515.
6. Prepared this Geotechnical Services Report for the project.

These Geotechnical Services were performed in general accordance with Advisory Circular AC150/5320-6F.

### **3.0 RESULTS OF SUBSURFACE EXPLORATION**

#### **3.1 Review of USDA Soil Survey, Broward County, Florida**

Based on a review of the “Soil Survey of Broward County Area, Florida”, prepared by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), there is one soil types within the project area. The following soil-mapping unit is noted within the vicinity of the project corridor. All references to depth are general in nature and related to the existing ground surface. A graphical depiction of the soil map area is included in the Appendix.

##### Map Unit 34 - St. Lucie fine sand, 0 to 2 percent slopes

The St. Lucie component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian or sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

#### **3.2 Field Exploration**

The subsurface conditions at the site were evaluated by performing fifteen (15) SPT borings drilled to a depth of at least 10 to 20 feet below the existing grade at each location. Asphalt core samples were taken at four (4) of the SPT boring locations. The quantity of borings and cores to perform, and their locations, was provided by HDR, Inc. The locations were determined in the field by hand held GPS equipment. Approximate locations of the borings are presented in the Appendix, Sheet 1. The borings were drilled using a truck mounted CME-55 and/or D-50 drill rig, and mud rotary and casing procedures. Samples of the in-place materials were recovered at 2-foot intervals using a standard split spoon driven with an automatic 140-pound hammer freely falling 30 inches (the SPT sampling after ASTM D 1586) for the uppermost 10 feet, and on 5-foot intervals below. The samples of the in-place soils were placed in airtight jars and returned to our laboratory for classification by a geotechnical engineer. The samples were visually classified in general accordance with the ASTM Soil Classification System.

#### **3.3 General Soil Condition**

Of the locations of the borings performed, the surface was either covered with asphalt, fill material with sandy limerock, or topsoil. The fill material existed typically to a depth of approximately 2 feet below grade. A light gray to brown sand material (SP) exists below the fill material to depths of 10 to 20 feet below the site grades.

Samples were chosen for laboratory testing to confirm the visual classifications. Tests included full sieve analysis, organic content testing and natural moisture content testing. A Summary of Laboratory Testing is included in the Appendix.

Standard Penetration N-Values are indicative that the near surface (upper two feet) sandy soil materials are variable in their levels of density, with recorded values in categories: loose, medium, dense and very dense. The soils immediately below the pavement sections appear to have been improved, existing in all locations in the dense to very dense condition. The surface soil at location B-1B had the surface soils in the loose condition. All other soils had relative density soils of medium or greater. Soil profiles encountered in the borings are also presented in the Appendix, Sheets 2 and 3.

A Geotechnical engineer bases soil stratification on a visual review of the recovered samples, laboratory testing, and interpretation of the field boring logs. The boring stratification lines represent the approximate boundaries between soil types of significantly different engineering properties; however, the actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation may have been abbreviated or omitted for clarity. The boring profiles represent the conditions at the boring location and variations do occur and should be expected among the borings.

### **3.4 Pavement Cores**

A total of four (4) pavement cores were obtained at locations shown on the attached Site Plan, Sheet 1. The asphalt pavement thickness at the core locations tested ranged from 2 to 4 inches. The base material observed beneath the cores was Limerock. The base course ranged from 6 to 9 inches in thickness. The subgrade was observed to be a brown sand at all locations. Where visible changes in the subgrade were noticeable, the subgrade was noted to have layer thickness range of 3 to 9 inches below the base material. Core data obtained at individual locations are included in the Appendix.

### **3.5 Groundwater Conditions**

Drilling fluid in the SPT testing process makes measurement of groundwater table below 10 feet difficult. Where possible, the groundwater level was measured at the boring locations following termination of drilling. The groundwater table measured in the borings was noted to be at a depth of approximately 9 feet below the existing grades. Some locations are noted as no groundwater within 10 feet of the ground surface. The groundwater table measured at each of the boring locations is presented on the boring profiles in the Appendix.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences (i.e. existing canals, swells, irrigation, drainage ponds, under drains and areas of covered soils like, paved parking lots and sidewalks). Fluctuation should be anticipated. We anticipate the seasonal fluctuation of the groundwater to be approximately 2 feet from the recorded water table depth. We recommend that the contractor determine the actual groundwater levels at the time of construction to determine groundwater impact on his construction procedure.



### 3.6 Limerock Bearing Ratio (LBR) Tests

A total of three (3) Limerock Bearing Ratio (LBR) test samples were collected at locations selected along the proposed improvement areas. The collected samples were taken to our laboratory for testing. Laboratory LBR values were 45, 43 and 42, with an average LBR of 43.3. The test results for field and laboratory LBR's are attached in the Appendix.

LBRs were ran only from the sand material at the locations noted. The location of the LBR samples are presented on the Sheet 1 in the Appendix

### 3.8 Laboratory Test Results

Samples from the borings were field classified, placed in sealed containers, and transported to the laboratory for further analysis by a geotechnical engineer. Our classification was based on visual inspection, using the results from the laboratory testing as confirmation. The following tests (including number) were performed on selected representative samples to determine their Laboratory index property. In addition, bulk samples of existing subgrade soils were delivered to our laboratory for LBR tests. A summary of laboratory test results is included in the Appendix.

Table 3.8 Testing Completed	
Type of Lab Testing	Quantity of Tests
Natural Moisture Content	2
Grain Size Analysis	2
Organic Content	2
Limerock Bearing Ratio	3

## 4.0 EVALUATION AND RECOMMENDATIONS

### 4.1 Geotechnical Discussion

The geotechnical study completed for the proposed improvements confirms that the site is suitable for the planned construction when viewed from a soil mechanics and foundation engineering perspective. Subsurface conditions at the site are not expected to impose any major geotechnical constraints or limitations on the constructed project.

The new structures may be supported on shallow spread foundations with a maximum bearing pressure of 3,000 pounds per square foot (psf) and employ conventional slab-on-grade for the ground floor after following proper site preparation procedures described in Section 4.2. Densification of the surficial soils of the site will be needed to increase the shear strength and reduce foundation and slab settlements to tolerable values.

Recommendations for site preparation, foundation design and related construction are presented in the following sections of this report.

### 4.2 Site Preparation

To prepare for construction, we recommend that existing vegetation be removed from the proposed construction areas, and that the building footprint and 10 feet beyond be proof rolled with a self-propelled roller (Ingersoll-Rand SD 100D or equivalent) with at least **20 passes (with an operating vibration frequency of 31.5 Hz/1890 VPM and average speed of 1.4 mph)** and until the subsoils achieve 95 percent of maximum dry density per ASTM D 1557 (Modified Proctor) to a depth of at least **12 inches below the existing grade. Existing utilities should be identified and removed or re-routed as required. Underground pipes that cannot be removed should be pressure grouted.** The soil densification should encompass the entire footprint of the structure plus a 10-foot wide perimeter that extends beyond the maximum lines of the superstructure.

Rolled subgrade should be visually observed for signs of pumping, weaving or other types of instability. Signs of such instability could be due to the existence of weak and/or compressible subsoils. Corrective action for this condition should include excavation of weak subsoils followed by replacement with clean granular fill compacted to 95 percent of the ASTM D 1557 maximum dry density. Structural fill used to raise the site to structure bottom levels should consist of clean sand and/or sand and gravel (ASTM D 2487), with a maximum of 12 percent passing the U.S. Standard No. 200 sieve. The structural fill should be placed in thin lifts (12-inch thick loose measure or less), near the optimum moisture content for compaction, and be compacted to at least 95 percent of maximum dry density (ASTM D 1557).

Existing building structures and foundations near the proposed addition need to be protected against vibrations. Near existing buildings (within 50 feet), proofrolling should be performed in a static mode. The subsoils should be compacted to achieve 95 percent of maximum dry density

(ASTM D 1557) to a depth of at least 12 inches below the stripped grade. Ground vibrations induced by the compaction operations should be closely monitored to assess if there is a potential impact to any existing adjacent structures.

Following site preparation as discussed above, the foundation areas should be excavated and compacted to **98 percent** of maximum dry density per ASTM D 1557 (Modified Proctor) to a depth of at least **12 inches below the footing subgrade**. The footings should be poured in-the-dry. Unsuitable material or organic soils (if any) found at foundation bottoms at any location should be removed and replaced with structural fill, constructed as discussed above.

In places where additional structural fill is required to achieve design grade, each lift of compacted engineered fill should be tested by a representative of the geotechnical engineer prior to placement of subsequent lifts. The edges of compacted fill should extend at least 5 feet beyond the edges of buildings prior to sloping.

### 4.3 Foundation Recommendations

#### **Spread Foundation after general site preparation**

Conventional spread footings are generally most economical when the existing soil conditions allow them to be founded at shallow depths. Based on the data currently available and given the site preparation is completed as discussed above, we recommend supporting the planned structure on conventional spread foundations based in engineered fill and/or the surficial granular soils of the site. The footings should be designed and proportioned for a maximum bearing pressure of 3,000 pounds per square foot (psf). The width and depth of footings should meet, as a minimum the most current Florida Building Code requirements.

Settlement of foundations based in the in-situ granular soils and/or engineered fill will occur as an elastic response of the soils to the building loads applied. Given site and soil preparation that is completed before footing construction, and using the design criteria discussed above, we estimate that total and differential foundation settlements should be about 1½ inches and ¾ inch, respectively. The settlement forecast is based on imposed soil bearing pressure from structural loadings not exceeding 3,000 pounds per square foot. These settlement estimates need to be confirmed or modified once loading information becomes available. Because the subsoils of the site are granular in nature, settlement should occur as the loads are applied to foundations and should essentially be complete by the time the building superstructures are finished.

Excavating equipment may disturb the granular bearing soil in foundation areas. The upper 12 inches of foundation bottom soils should be compacted to achieve not less than 95 percent of the maximum dry density, as determined by ASTM D 1557, immediately prior to reinforcing and concrete placement. The footings will likely require shoring or temporary retaining systems to maintain the stability of nearby soils.

#### 4.4 Floor Slab Recommendations

We recommend the procedures described in “Site Preparation” section of this report be used to prepare the floor slab subgrade. Slab-on-grade construction may then be employed for the ground floor of the building. The floor slab should be suitably reinforced to make it as rigid as practical. Joints should be provided at the junctions of the slab with the walls and columns so that a small amount of independent movement can occur without causing damage. The floor slab design, if based on elastic methods, should employ a modulus of subgrade reaction of 150 pounds per cubic inch (pci).

If moisture intrusion into the floor slab is not desired, an impermeable membrane should be installed on the soil subgrade before the slab is cast. Normally, a 6-mil thick polyethylene film is satisfactory as a subgrade moisture barrier. However, some floor coverings may have a comparatively sensitive tolerance to moisture flux that a thin polyethylene film cannot suppress. Under these conditions, other types of moisture membranes may need to be considered.

Due to the nature of the building, proper means of drainage must be provided to remove water away from the foundations and slab areas.

#### 4.5 Utilities

All utilities should be installed per the requirements of the Civil Engineering drawings and specifications. When backfilling over utility lines, the fill should be placed in lifts and compacted to at least 95% of the material’s maximum dry density as determined by the Modified Proctor Compaction Test (ASTM D 1557). The loose lift thickness is expected to vary between 6 inches and 12 inches depending on the compaction equipment used by the contractor. Layers of limestone were noted in some of the borings.

### 5.0 PAVEMENT RECOMMENDATIONS

The parking lot and driveway areas for the project should be prepared and densified as indicated in the Site Preparation section of this report. Flexible pavement sections in this geographic area typically consist of an asphaltic concrete wearing course, limerock base course and a stabilized subgrade. The following pavement component thicknesses could be utilized. **However, actual pavement section thickness should be provided by the Design Civil Engineer based on FAA Circular Guidelines, traffic loads, volume, and the owner's design life requirements.**

TYPE OF PAVEMENT	MATERIAL DESCRIPTION	LAYER THICKNESS (INCHES)	
		PARKING AREAS	DRIVEWAY AREAS
Flexible	Asphaltic Concrete	1.5	2.0
	Base Course (LBR = 100)	8	8
	Stabilized Subgrade (LBR = 40)	12	12

The base course materials in the pavements should consist of limerock, having a minimum Limerock Bearing Ratio (LBR) of 100. Base materials should meet the requirements presented in the latest revisions of the Florida Department of Transportation (FDOT) "Specifications for Road and Bridge Construction," Section 911 (limerock). The base course should be compacted to at least 98 percent of maximum dry density (AASHTO 180).

The subgrade should be stabilized to a depth of 12 inches to achieve a minimum LBR of 40. This can be achieved by blending base material (limerock) with the existing sandy subgrade soils. The required mixing ratio should be determined by laboratory testing. The stabilized subgrade should be compacted to at least 98 percent of maximum dry density (AASHTO 180).

If dumpsters are to be parked on the pavement, it is recommended that rigid concrete pavement be constructed. In addition, the apron utilized for unloading the dumpsters by heavy-duty trucks should also be provided with a rigid pavement. A minimum Portland concrete pavement thickness of 6 inches is recommended for the project if a rigid pavement is employed. The concrete should be reinforced to withstand the traffic loadings anticipated and should be jointed to reduce the chances for crack development. The minimum rigid pavement thickness recommended above is based upon concrete with an unconfined compressive strength of 3,500 psi and a modulus of rupture of 450 psi.

**Actual pavement section thickness should be provided by the Design Civil Engineer based on traffic loads, volume, and the owner's design life requirements.** The noted sections represent minimum thickness representative of typical local construction practices and, as such, periodic maintenance should be anticipated. All pavement materials and construction procedures should conform to FDOT, American Concrete Institute (ACI), or appropriate city/county requirements.

## 6.0 CONSTRUCTION CONSIDERATIONS

It is recommended that TSF be retained to provide observation and testing of construction activities involved in the foundation, earthwork, and related activities of this project to verify subsurface conditions. TSF cannot accept any responsibility for any conditions that deviate from those described in this report, nor for the performance of the foundation if not engaged to also provide construction observation and testing for this project.

### 6.1 Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its “Construction Standards for Excavations, 29 CFR, part 1926, Subpart P.” This document was issued to better ensure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

Sloped open-cut excavations are expected to be sufficient for construction of the shallower footings. The footings will likely require shoring or temporary retaining systems to maintain the stability of nearby soils. Open excavations in these areas will required proper bracing, shoring to protect from sloughing of trench walls.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottoms. The contractor’s “responsible person”, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor’s safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. TSF does not assume responsibility for construction site safety or the contractor’s or other parties’ compliance with local, state, and federal safety or other regulations.

## 7.0 LIMITATIONS

Our Geotechnical engineering evaluation of the site and subsurface conditions with respect to the planned construction are based upon the following: (1) site observations, (2) the field exploratory test data obtained during the geotechnical study, and (3) our understanding of the project information.

This study did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air on or below, or around this site. Any statement in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

Upon the discovery of any site or subsurface conditions during construction, which appears to deviate from the data obtained during this Geotechnical exploration, please contact us immediately so that we may visit the site, observe the differing conditions, and evaluate the new information with regards to our evaluation and recommendations contained herein.

This geotechnical report has been prepared for the exclusive use of HDR, Inc. for the specific application to the proposed FXE AES Facility Expansion project at the Fort Lauderdale Airport in Broward County, Florida.

## **APPENDIX A**

### **USDA-NRCS Soil Map**

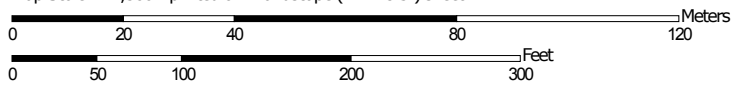


Soil Map—Broward County, Florida, East Part  
(FXE AES Facility Expansion)



Soil Map may not be valid at this scale.

Map Scale: 1:1,360 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84



Natural Resources  
Conservation Service


Web Soil Survey  
National Cooperative Soil Survey

CAM 1/29/2019  
Page 1 of 3  
Page 693 of 725


Soil Map—Broward County, Florida, East Part  
(FXE AES Facility Expansion)


## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Broward County, Florida, East Part

Survey Area Data: Version 14, Sep 17, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 17, 2014—Feb 11, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
34	St. Lucie fine sand, 0 to 2 percent slopes	5.8	100.0%
<b>Totals for Area of Interest</b>		<b>5.8</b>	<b>100.0%</b>



## **APPENDIX B**

### **Pavement Core Data Pavement Core Photographic Documentation**

**AES Facility Expansion at FXE  
Fort Lauderdale, Florida  
Tierra South Florida Project 7111-18-488**

**Pavement and Base Material Data Sheet**

Core ID	Core Date	Station	Lane	Number of Layers Estimated	Pavement Layers						Total Core Length (in.)	Base Material		Subgrade		Pavement Condition	Notes
					Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6		Type Stratum	Thickness (in.)	Type Stratum	Thickness (in.)		
PC-2	1/15/2019				2	2					4.0	LR	6.0	BROWN SAND	3.0	F	
PC-3	1/15/2019				2.4						2.4	LR	6.0	BROWN SAND	8.0	F	
PC-4	1/15/2019				2						2.0	LR	9.0	BROWN SAND	6.0	F	
PC-5	1/15/2019				2	1.8					3.8	LR	8.0	BROWN SAND	9.0	F	

Remarks: LR= Limerock

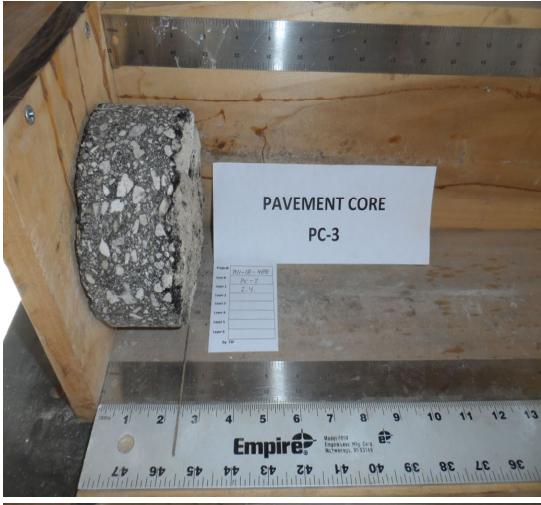
Pavement Conditions: G = Good  
F = Fair  
P = Poor  
B = Bad

Pavement conditions based on visual observations only

AES Facility Expansion at FXE  
Fort Lauderdale, FL  
Tierra South Florida Project 7111-18-488  
Core Photos



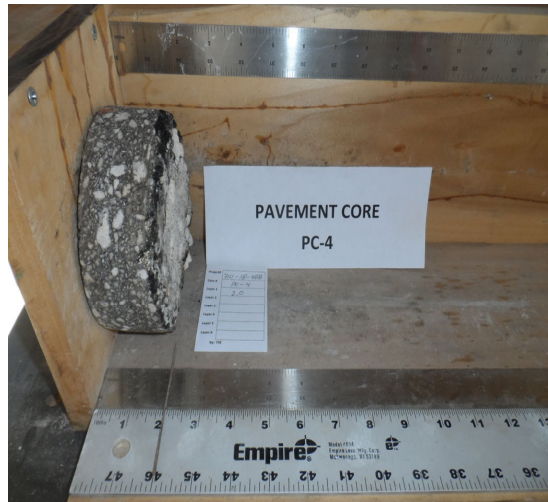
Core ID	Number of Layers Estimated	Total Core Length (in.)	Pavement Condition
PC-2	2	4	F
	Pvt Layer 1 (in.)	Base Material Type	
	2	LR	
	Pvt Layer 2 (in.)	Base Material Thickness (in.)	
	2	6	
		Subgrade Type - Stratum	
		BROWN SAND	
		Subgrade Thickness (in.)	
		8	



Core ID	Number of Layers Estimated	Total Core Length (in.)	Pavement Condition
PC-3	1	2.4	F
	Pvt Layer 1 (in.)	Base Material Type	
	2.4	LR	
		Base Material Thickness (in.)	
		9	
		Subgrade Type - Stratum	
		BROWN SAND	
		Subgrade Thickness (in.)	
		6	



**AES Facility Expansion at FXE  
Fort Lauderdale, FL  
Tierra South Florida Project 7111-18-488  
Core Photos**



Core ID	Number of Layers Estimated	Total Core Length (in.)	Pavement Condition
PC-4	1	2	F
	Pvt Layer 1 (in.)	Base Material Type	
	2	LR	
		Base Material Thickness (in.)	
		8	
		Subgrade Type - Stratum	
		BROWN SAND	
		Subgrade Thickness (in.)	
		9	



Core ID	Number of Layers Estimated	Total Core Length (in.)	Pavement Condition
PC-5	2	3.8	F
	Pvt Layer 1 (in.)	Base Material Type	
	2	LR	
	Pvt Layer 2 (in.)	Base Material Thickness (in.)	
	1.8	6	
		Subgrade Type - Stratum	
		BROWN SAND	
		Subgrade Thickness (in.)	
		3	

## **APPENDIX C**

Summary of Laboratory Tests Results

Summary report of Moisture Density Relationship-LBR-FM5-515

Report of Moisture Density Relationship-LBR-FM5-515



<p align="center"> <b>Summary of Laboratory Test Results</b>  <b>Fort Lauderdale Airport (FXE) Aviation Equipment Service (AES) Expansion</b>  <b>Fort Lauderdale, Florida</b> </p> <p align="center"> <b>TSF Project No: 7111-18-488</b> </p>
--

Boring Number	Sample Depth (ft)	USCS Symbol	Sieve Analysis, Percentage Passing								Atterberg Limits			Organic Content (%)	Natural Moisture Content (%)
			3/4"	3/8"	#4	#10	#40	#60	#100	#200	Liquid Limit	Plastic Limit	Plasticity Index		
1	0-1	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
2	1-2	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
3	2-3	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
4	3-4	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
5	4-5	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
6	5-6	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
7	6-7	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
8	7-8	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
9	8-9	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
10	9-10	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
11	10-11	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
12	11-12	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
13	12-13	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
14	13-14	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
15	14-15	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
16	15-16	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
17	16-17	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
18	17-18	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
19	18-19	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
20	19-20	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
21	20-21	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
22	21-22	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
23	22-23	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
24	23-24	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
25	24-25	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
26	25-26	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
27	26-27	CL	100	100	100	100	100	100	100	100	25	15	10	0	20
28	27-28														

[illegible]

## SUMMARY REPORT OF MOISTURE DENSITY RELATIONSHIP

**Project name:** Fort Lauderdale Airport (FXE) Aviation Equipment Service (AES) Expansion

**TSF Project No:** 7111-18-488

Location ID	Maximum Dry Density (PCF)	Optimum Moisture (%)	LBR Value	Comments
LBR-1	116.0	8.6	45	(Obtained below base material within Subgrade at about 1 to 2 feet depth from surface).
LBR-2	115.0	8.4	43	(Obtained below base material within Subgrade at about 1 to 2 feet depth from surface).
LBR-3	104.2	16	42	(Obtained below base material within Subgrade at about 1 to 2 feet depth from surface).

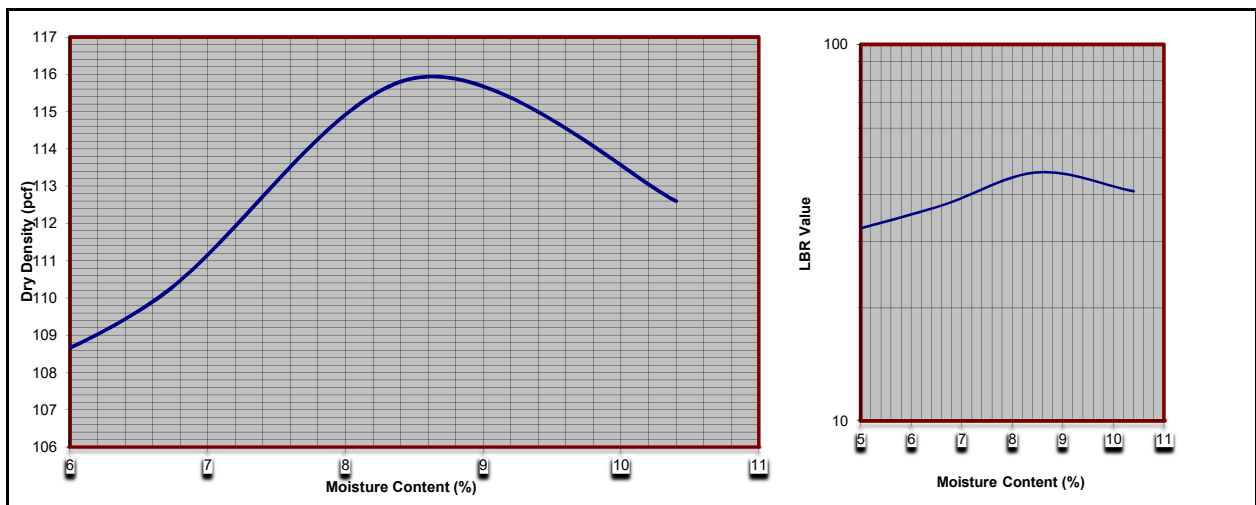
# REPORT OF MOISTURE DENSITY RELATIONSHIP

Tested for: HDR, Inc.

Project: Fort Lauderdale Airport (FXE) Aviation Equipment Service (AES) Expansion

TSF Project #: 7111-18-488

Date: 02/09/18



## SOIL DESCRIPTION

Visual Classification: Brown Fine Sand with some Limestone (LBR #1)

Sample Source:

Method of Test: FM 5-515 (LBR)

Surcharge = 15 lbs

Test Results:

Maximum Dry Density : 116 pcf

Optimum Moisture = 8.6 %

LBR Value: 45

## Note:

These test results apply only to the specific locations noted and may not represent any other location or elevations. Reports may not be reproduced, except in full, without permission by Tierra South Florida, Inc.

Respectfully Submitted  
**Tierra South Florida, Inc.**

Harmon C. Bennett, P.E.  
Principal Engineer  
Florida Registration No. 53130

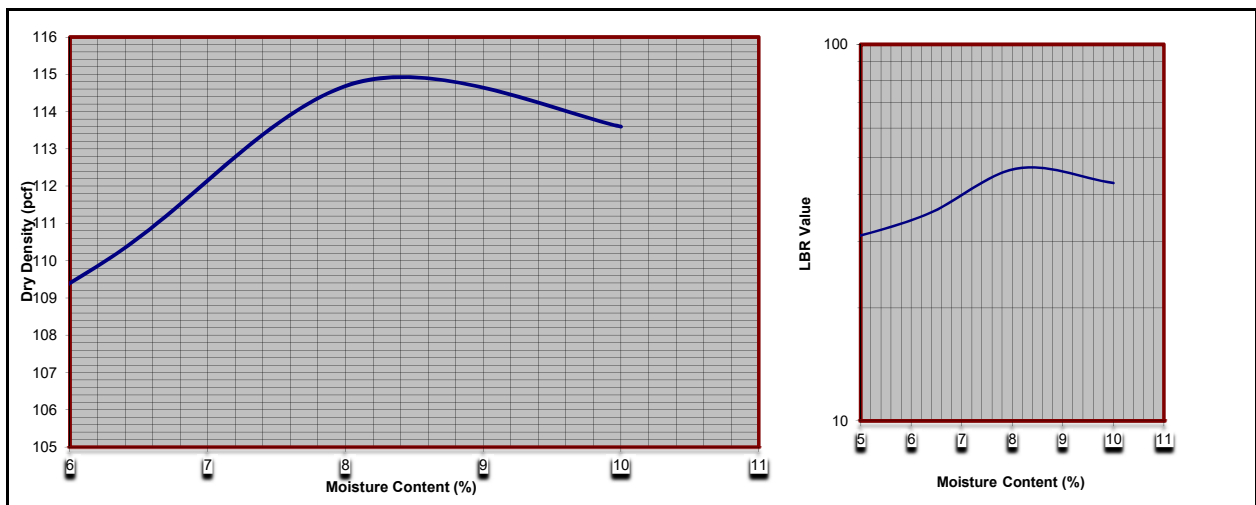
# REPORT OF MOISTURE DENSITY RELATIONSHIP

Tested for: HDR, Inc.

Project: Fort Lauderdale Airport (FXE) Aviation Equipment Service (AES) Expansion

TSF Project #: 7111-18-488

Date: 02/09/19



## SOIL DESCRIPTION

Visual Classification: Brown Fine Sand with some Limestone (LBR #2)

Sample Source:

Method of Test: FM 5-515 (LBR)

Surcharge = 15 lbs

Test Results:

Maximum Dry Density : 115 pcf

Optimum Moisture = 8.4 %

LBR Value: 43

## Note:

These test results apply only to the specific locations noted and may not represent any other location or elevations. Reports may not be reproduced, except in full, without permission by Tierra South Florida, Inc.

Respectfully Submitted  
**Tierra South Florida, Inc.**

Harmon C. Bennett, P.E.  
Principal Engineer  
Florida Registration No. 53130

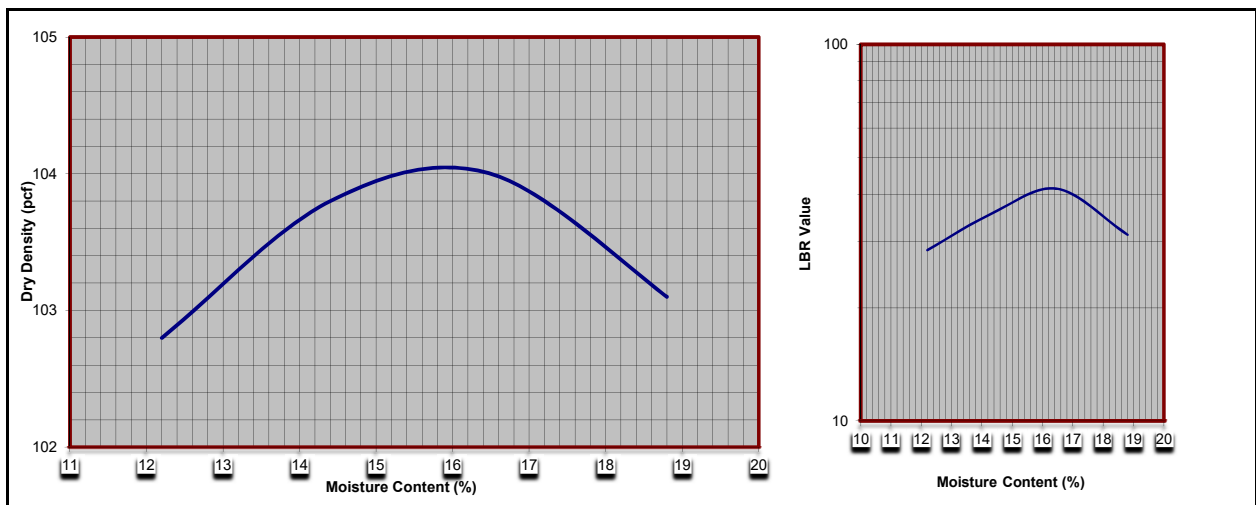
# REPORT OF MOISTURE DENSITY RELATIONSHIP

Tested for: HDR, Inc.

Project: Fort Lauderdale Airport (FXE) Aviation Equipment Service (AES) Expansion

TSF Project #: 7111-18-488

Date: 02/09/19



## SOIL DESCRIPTION

Visual Classification: Gray Fine Sand with some Limestone (LBR #3)

Sample Source:

Method of Test: FM 5-515 (LBR)

Surcharge = 15 lbs

Test Results:

Maximum Dry Density : 104.2 pcf

Optimum Moisture = 16 %

LBR Value: 42

## Note:

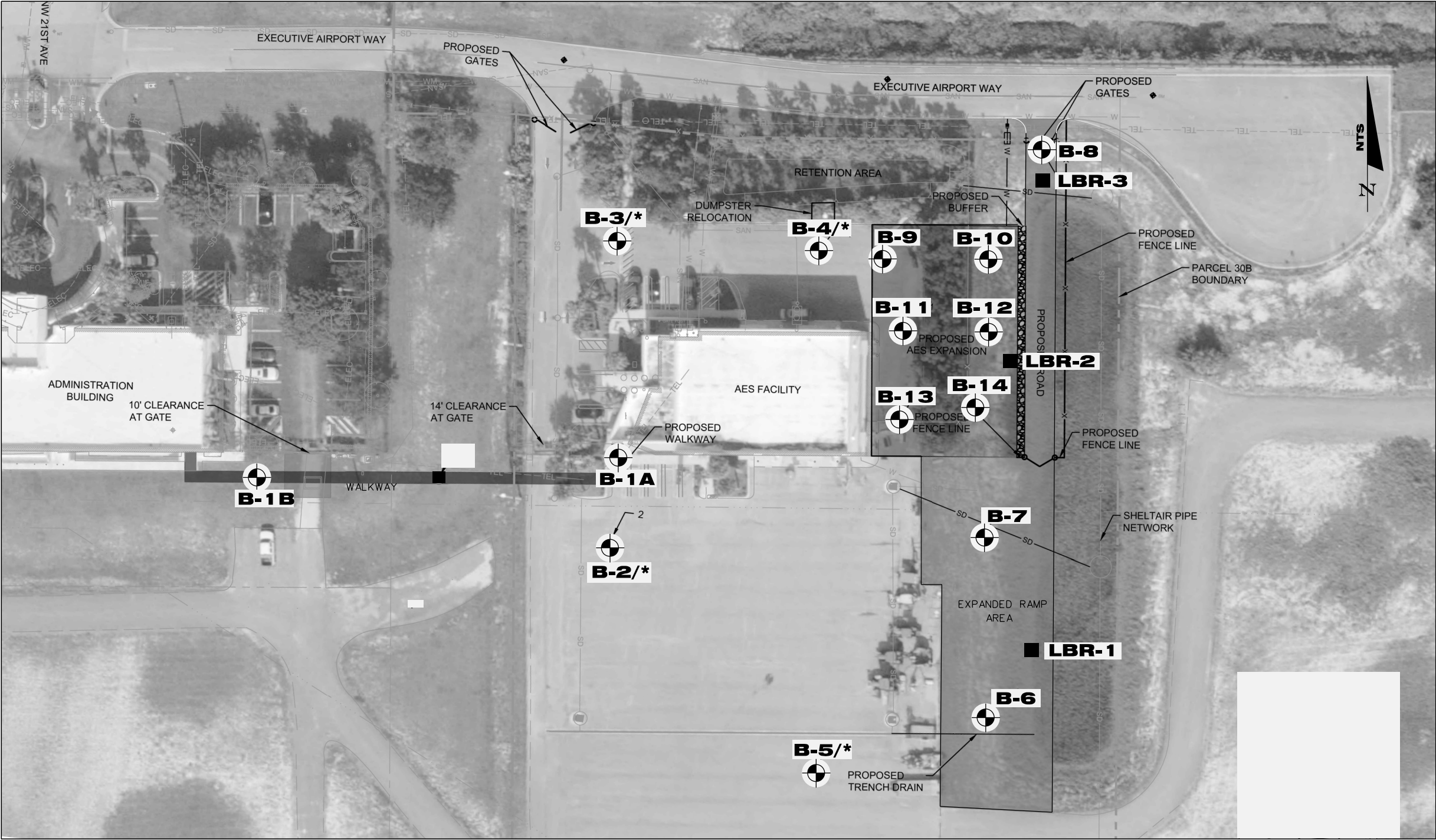
These test results apply only to the specific locations noted and may not represent any other location or elevations. Reports may not be reproduced, except in full, without permission by Tierra South Florida, Inc.

Respectfully Submitted  
**Tierra South Florida, Inc.**




Harmon C. Bennett, P.E.  
Principal Engineer  
Florida Registration No. 53130

## **APPENDIX D**

Boring Location Plan, Sheet 1  
Soil Profiles, Sheets 2 and 3



**BORING LOCATION PLAN**

-  **Approximate Location of SPT Boring**
-  **Includes Asphalt Core**
-  **Approximate Location of LBR Sampling**

DRAWN BY: <b>NG</b>	APPROVED BY: <b>RK</b>	ENGINEER OF RECORD: <b>RAJ KRISHNASAMY, P.E.</b> FLORIDA LICENSE NO.: <b>53567</b>
CHECKED BY: <b>JO</b>	DATE: <b>01-25-2019</b>	



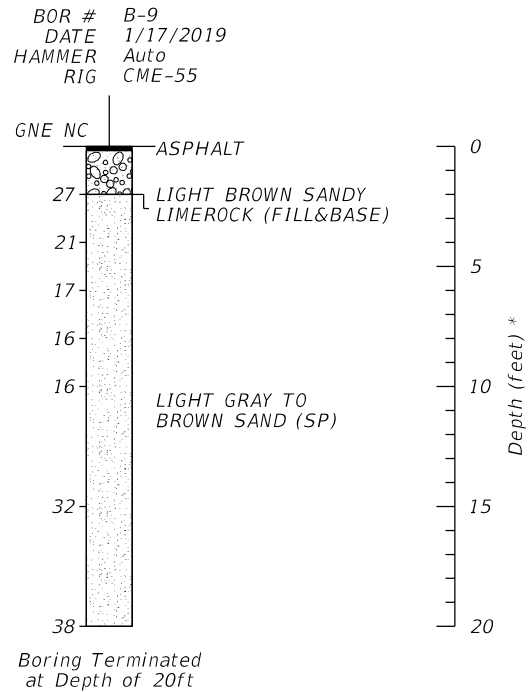
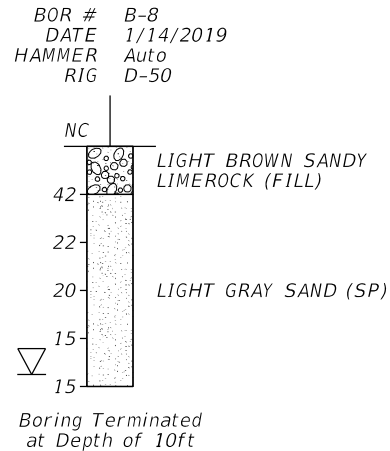
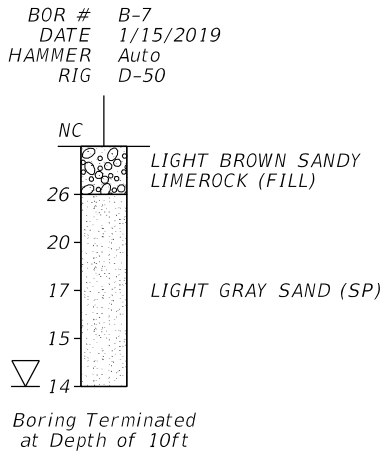
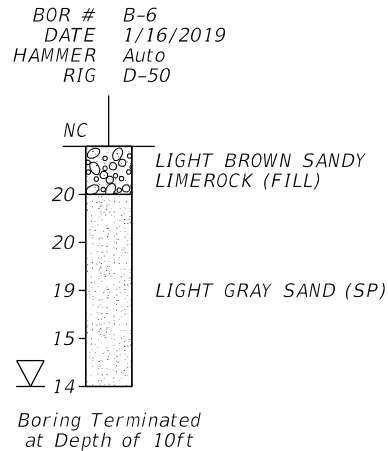
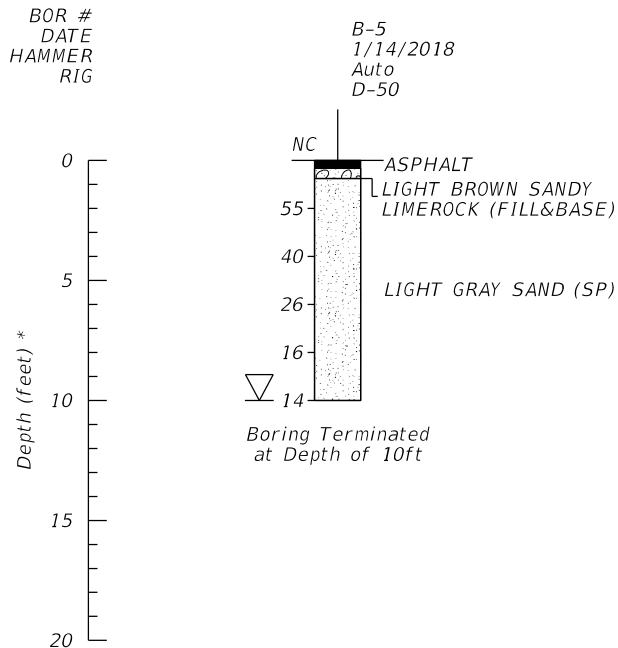
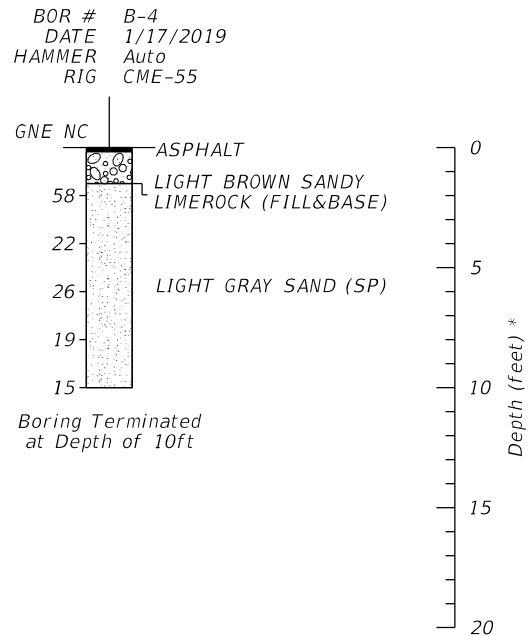
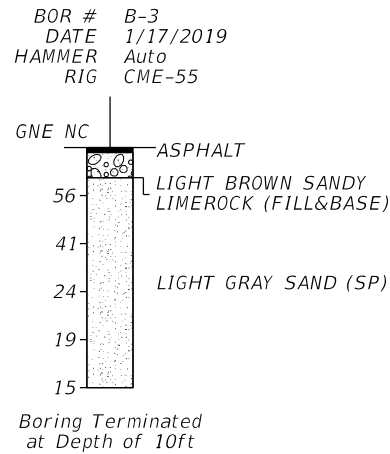
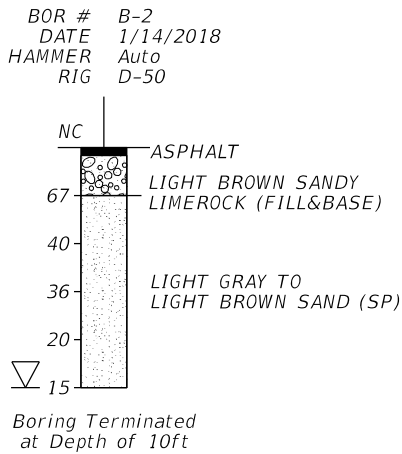
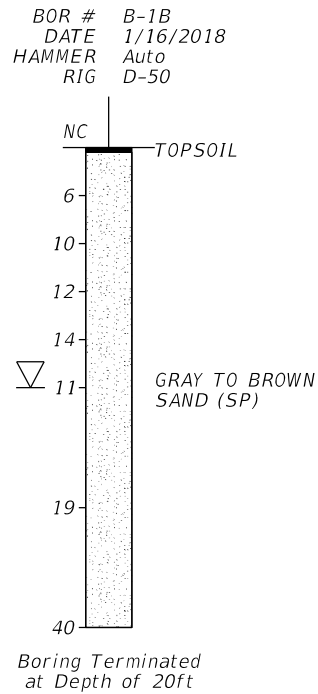
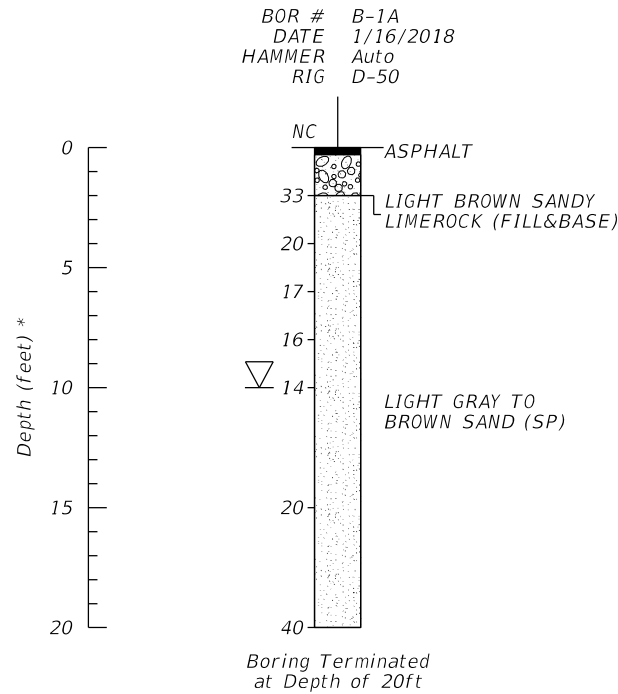
RAJ KRISHNASAMY, P.E.  
P.E. LICENSE NUMBER 53567  
TIERRA SOUTH FLORIDA  
2765 VISTA PARKWAY, S-10  
WEST PALM BEACH, FL 33411  
CERTIFICATE OF AUTHORIZATION 28073

SCALE: <b>NTS</b>	PROJECT NUMBER: <b>7111-18-488</b>
----------------------	---------------------------------------

**BORING LOCATION PLAN**  
**AES FACILITY EXPANSION AT FXE**  
**FORT LAUDERDALE, FLORIDA**

Sheet:  
**1**

CAM #25-0378  
Exhibit 1



LEGEND

- Asphalt/Topsoil
- Sandy Gravel
- Sand

NOTES

- ENCOUNTERED GROUNDWATER TABLE
- \* DENOTES DEPTH IN FEET FROM EXISTING GROUND SURFACE
- NC NUMBERS TO THE LEFT OF BORINGS INDICATE CORRECTED SPT VALUE FOR 12" PENETRATION OBTAINED USING AN AUTOMATIC HAMMER CORRECTION FACTOR OF 1.24

DRAWN BY:  
NG  
CHECKED BY:  
JO

APPROVED BY:  
RK  
DATE:  
01-25-2019

ENGINEER OF RECORD:  
RAJ KRISHNASAMY, P.E.  
FLORIDA LICENSE NO.:  
53567



RAJ KRISHNASAMY, P.E.  
P.E. LICENSE NUMBER 53567  
TIERRA SOUTH FLORIDA  
2765 VISTA PARKWAY, S-10  
WEST PALM BEACH, FL 33411  
CERTIFICATE OF AUTHORIZATION 28073

SCALE:  
NTS

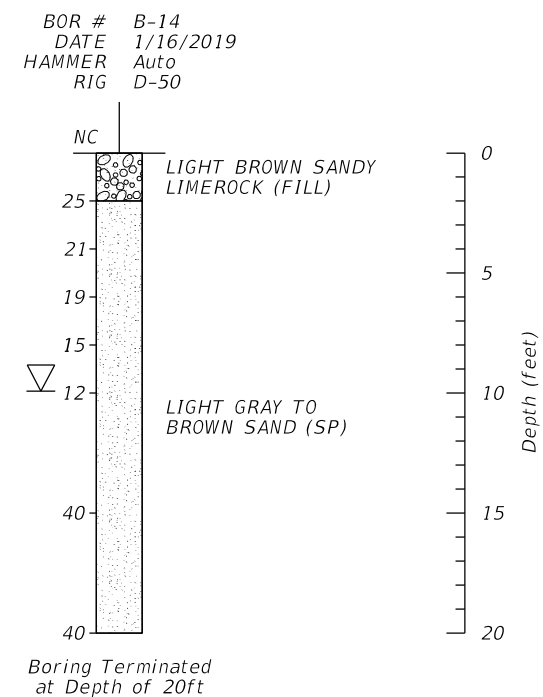
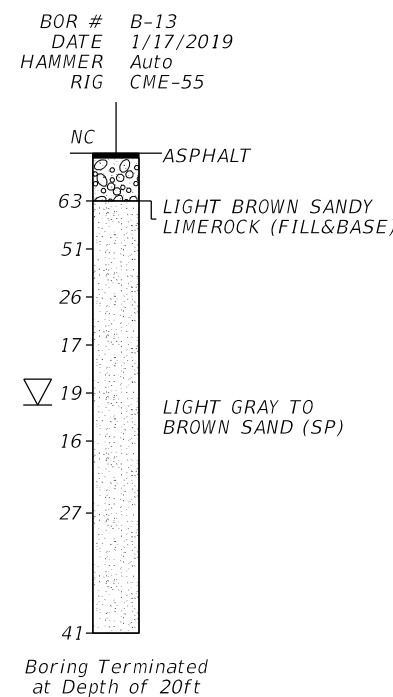
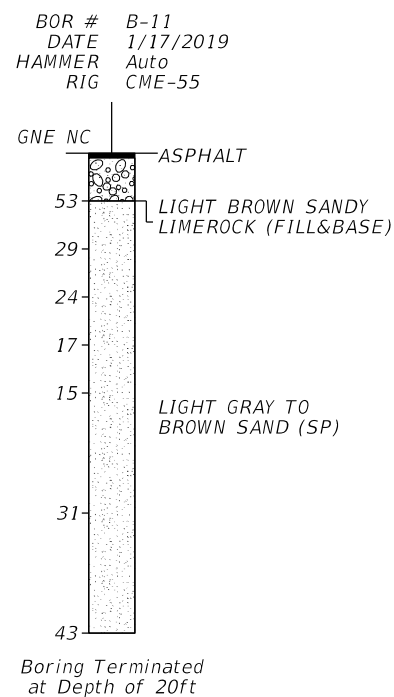
PROJECT NUMBER:  
7111-18-488

SOIL PROFILES  
AES FACILITY EXPANSION AT FXE  
FORT LAUDERDALE, FLORIDA

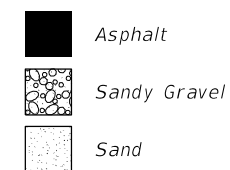
Sheet:  
2

CAM #25-0378  
Exhibit 1





LEGEND



NOTES

▽ ENCOUNTERED GROUNDWATER TABLE  
 GNE GROUNDWATER NOT ENCOUNTERED  
 \* DENOTES DEPTH IN FEET FROM  
 EXISTING GROUND SURFACE  
 NC NUMBERS TO THE LEFT OF BORINGS INDICATE  
 CORRECTED SPT VALUE FOR 12" PENETRATION  
 OBTAINED USING AN AUTOMATIC HAMMER  
 CORRECTION FACTOR OF 1.24

DRAWN BY:  
**NG**


CHECKED BY:  
**JO**

APPROVED BY:  
**RK**

DATE:  
**01-25-2019**

ENGINEER OF RECORD:  
**RAJ KRISHNASAMY, P.E.**  
FLORIDA LICENSE NO.:  
**53567**



 RAJ KRISHNASAMY, P.E.  
P.E. LICENSE NUMBER 53567  
TIERRA SOUTH FLORIDA  
2765 VISTA PARKWAY, S-10  
WEST PALM BEACH, FL 33411  
CERTIFICATE OF AUTHORIZATION 28073

SCALE:

NTS

PROJECT NUMBER:

7111-18-488

# SOIL PROFILES AES FACILITY EXPANSION AT FXE FORT LAUDERDALE, FLORIDA

Sheet:

3

CAM #25-0378  
Exhibit 1



City of Fort Lauderdale Procurement Services Division  
101 NE 3<sup>rd</sup> Avenue, Suite 1650, Fort Lauderdale, Florida 33301  
954-828-5933 Fax 954-828-5576  
[purchase@fortlauderdale.gov](mailto:purchase@fortlauderdale.gov)

**ADDENDUM NO. 3**  
ITB Event 302 – AES Facility Expansion  
October 8, 2024

This addendum is issued to make the following changes:

**1. Event Close Date:**

Changed from 10/09/2024 to 10/23/2024 at 2:00 pm (EST)

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_

Bidder's Signature: \_\_\_\_\_

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



City of Fort Lauderdale Procurement Services Division  
101 NE 3<sup>rd</sup> Avenue, Suite 1650, Fort Lauderdale, Florida 33301  
954-828-5933 Fax 954-828-5576  
[purchase@fortlauderdale.gov](mailto:purchase@fortlauderdale.gov)

**ADDENDUM NO. 4**  
ITB Event 302 – AES Facility Expansion  
October 23, 2024

This addendum is issued to make the following changes:

**1. Event Close Date:**

Changed from 10/23/2024 to 11/06/2024 at 2:00 pm (EST)

Reason: Pending addendum to add applicable Federal Aviation Administration (FAA) Provisions

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_

Bidder's Signature: \_\_\_\_\_

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



City of Fort Lauderdale Procurement Services Division  
101 NE 3<sup>rd</sup> Avenue, Suite 1650, Fort Lauderdale, Florida 33301  
954-828-5933 Fax 954-828-5576  
[purchase@fortlauderdale.gov](mailto:purchase@fortlauderdale.gov)

**ADDENDUM NO. 5**  
ITB Event 302 – AES Facility Expansion  
October 23, 2024

This addendum is issued to make the following changes:

**1. Drawings:**

The Drawings for this project are hereby identified as secured and exempt from the Public Records Law, pursuant to Florida Statute Chapter 119.071.

**2. New Form:**

To receive a copy of the Drawings, please refer to the Addendum No. 5 – Plans Request Form and submit as instructed.

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_  
Bidder's Signature: \_\_\_\_\_  
Date: \_\_\_\_\_



**CITY OF FORT LAUDERDALE  
PLANS REQUEST FORM  
For Architects, Engineers, and Contractors**

**Building Plans**

Pursuant to Section 119.071(3)(b), Florida Statutes (2022), building plans, blueprints, schematic drawings, and diagrams, including draft, preliminary, and final formats, which depict the internal layout and structural elements of the Project described in the Solicitation, (collectively, "Plans"), are exempt from public inspection and copying except to a licensed architect, engineer, or contractor who is performing work on or related to the Project. **The entities and persons receiving the Plans shall maintain the exempt status of the Plans.**

**Documents Requested:**

---

---

---



View only



Copies will be made

**Requester Information**

Name: \_\_\_\_\_

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

Work to be Performed on the Project by the Requester:

---

---

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

License Held: \_\_\_\_\_

License Number: \_\_\_\_\_

Phone: \_\_\_\_\_

E-mail: \_\_\_\_\_

As an authorized licensed architect, engineer, or contractor, the undersigned, on behalf of him/herself, and on behalf of the referenced company, agrees to maintain the exempt status of the Plans. Each bidder who is not awarded the contract for construction of the Project, each potential bidder who obtains the Plans ("potential bidder"), and each subcontractor who obtains the Plans ("subcontractor") agrees, at such person's or entity's expense, to return tangible Plans and any copies thereof to the City, destroy any electronic Plans, and certify the destruction of any electronic Plans to the City in writing, within fourteen days following the City Commission's award of the contract to the successful bidder. The failure by an unsuccessful bidder, potential bidder, or subcontractor to return tangible Plans and any copies thereof to the City, destroy any electronic Plans, and certify the destruction of any electronic Plans to the City in writing, within fourteen days following the City Commission's award of the contract to the successful bidder, shall constitute grounds for suspension of the unsuccessful bidder's or the potential bidder's or subcontractor's right to be included on a vendor database pursuant to Section 2-183, Code of Ordinances of the City of Fort Lauderdale, Florida, and for the City to pursue any remedy at law or in equity, in which case such unsuccessful bidder or potential bidder or subcontractor agrees to pay the City's attorney fees and costs. The undersigned further agrees that the failure to maintain the exempt status of the Plans shall constitute grounds for suspension of the bidder's or potential bidder's or subcontractor's right to be included on a vendor database pursuant to Section 2-183, Code of Ordinances of the City of Fort Lauderdale, Florida, and for the City to pursue any remedy at law or in equity, in which case such bidder, potential bidder, or subcontractor agrees to pay the City's attorney fees and costs.

Signature: \_\_\_\_\_

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

City of Fort Lauderdale  
Public Works Engineering Division  
100 N. Andrews Avenue  
Fort Lauderdale, Florida 33301

Email:

[SecureBidDocs@fortlauderdale.gov](mailto:SecureBidDocs@fortlauderdale.gov)

**A copy of the professional license must be provided by architects, engineers, and contractors before authorization is given to download Plans. Send a copy of the license and this completed form via email.**



City of Fort Lauderdale Procurement Services Division  
101 NE 3<sup>rd</sup> Avenue, Suite 1650, Fort Lauderdale, Florida 33301  
954-828-5933 Fax 954-828-5576  
[purchase@fortlauderdale.gov](mailto:purchase@fortlauderdale.gov)

**ADDENDUM NO. 6**  
ITB Event 302 – AES Facility Expansion  
November 1, 2024

This addendum is issued to make the following changes:

**1. Event Close Date:**

Changed from 11/06/2024 to 11/20/2024 at 2:00 pm (EST)

Reason: Pending addendum to add applicable Federal Aviation Administration (FAA) Provisions

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_  
Bidder's Signature: \_\_\_\_\_  
Date: \_\_\_\_\_



City of Fort Lauderdale Procurement Services Division  
101 NE 3<sup>rd</sup> Avenue, Suite 1650, Fort Lauderdale, Florida 33301  
954-828-5933 Fax 954-828-5576  
[purchase@fortlauderdale.gov](mailto:purchase@fortlauderdale.gov)

**ADDENDUM NO. 7**  
ITB Event 302 – AES Facility Expansion  
November 20, 2024

This addendum is issued to make the following changes:

**1. Event Close Date:**

Changed from 11/20/2024 to 12/03/2024 at 2:00 pm (EST)

Reason: Pending addendum to add applicable Federal Aviation Administration (FAA) Provisions

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_  
Bidder's Signature: \_\_\_\_\_  
Date: \_\_\_\_\_



City of Fort Lauderdale Procurement Services Division  
101 NE 3<sup>rd</sup> Avenue, Suite 1650, Fort Lauderdale, Florida 33301  
954-828-5933 Fax 954-828-5576  
[purchase@fortlauderdale.gov](mailto:purchase@fortlauderdale.gov)

**ADDENDUM NO. 8**  
ITB Event 302 – AES Facility Expansion  
December 3, 2024

This addendum is issued to make the following changes:

**1. Event Close Date:**

Changed from 12/03/2024 to 12/20/2024 at 2:00 pm (EST)

Reason: Pending addendum to add applicable Federal Aviation Administration (FAA) Provisions

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_  
Bidder's Signature: \_\_\_\_\_  
Date: \_\_\_\_\_





City of Fort Lauderdale Procurement Services Division  
101 NE 3<sup>rd</sup> Avenue, Suite 1650, Fort Lauderdale, Florida 33301  
954-828-5933 Fax 954-828-5576  
[purchase@fortlauderdale.gov](mailto:purchase@fortlauderdale.gov)

**ADDENDUM NO. 9**  
ITB Event 302 – AES Facility Expansion  
December 12, 2024

This addendum is issued to make the following changes:

**1. Federal Aviation Administration (FAA) Provisions:**

The Federal Aviation Administration (FAA) Provisions, as uploaded to Attachments, are hereby incorporated by reference into this solicitation. Upon award, these provisions shall become binding requirements of the resulting Agreement. All bidders are advised to review these provisions carefully, as compliance with them will be mandatory for the awarded bidder.

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_

Bidder's Signature: \_\_\_\_\_

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

## **PROCUREMENT CONTRACTS (NON-AIP)**

### **REQUIRED FEDERAL PROVISIONS:**

#### **A. GENERAL CIVIL RIGHTS PROVISIONS**

In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

The above provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract.

#### **B. CIVIL RIGHTS – TITLE VI ASSURANCE**

##### ***1. Title VI Solicitation Notice***

##### **Title VI Solicitation Notice:**

The **City of Fort Lauderdale**, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders or offerors that it will affirmatively ensure that for any contract entered into pursuant to this advertisement, [select businesses, or disadvantaged business enterprises or airport concession disadvantaged business enterprises] will be afforded full and fair opportunity to submit bids in response to this invitation and no businesses will be discriminated against on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in consideration for an award.

##### ***2. Title VI List of Pertinent Nondiscrimination Acts and Authorities***

Insert this list in every contract or agreement, unless the Sponsor has determined and the FAA concurs, that the contract or agreement is not subject to the Nondiscrimination Acts and Authorities. This list can be omitted if the FAA has determined that the contractor or company is already subject to nondiscrimination requirements, which is a rare occurrence.

## **Title VI List of Pertinent Nondiscrimination Acts and Authorities**

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “Contractor”) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 USC § 2000d *et seq.*, 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-Assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 USC § 794 *et seq.*), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27 (Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance);
- The Age Discrimination Act of 1975, as amended (42 USC § 6101 *et seq.*) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 USC § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (PL 100-259) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990 (42 USC § 12101, *et seq.*) (prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration’s Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations);
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency

(LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs [70 Fed. Reg. 74087 (2005)];

- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC § 1681, et seq).

### **3. Compliance with Nondiscrimination Requirements:**

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor"), agrees as follows:

1. **Compliance with Regulations:** The Contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Nondiscrimination:** The Contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
3. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.
4. **Information and Reports:** The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the Sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a Contractor's noncompliance with the non-discrimination provisions of this contract, the Sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
  - a. Withholding payments to the Contractor under the contract until the Contractor complies; and/or
  - b. Cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The Contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the Sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the Sponsor to enter into any litigation to protect the interests of the Sponsor. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

***4. Clause for Construction/Use/Access to Real Property Acquired Under the Activity, Facility or Program***

The following clauses will be included in deeds, licenses, permits, or similar instruments/agreements entered into by City of Fort Lauderdale pursuant to the provisions of the Airport Improvement Program grant assurances.

- A. The (grantee, licensee, permittee, etc., as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, "as a covenant running with the land") that (1) no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination, (3) that the (grantee, licensee, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the Title VI List of Pertinent Nondiscrimination Acts and Authorities.
- B. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above Non-discrimination covenants, City of Fort Lauderdale will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same

as if said (license, permit, etc., as appropriate) had never been made or issued.\*

- C. With respect to deeds, in the event of breach of any of the above Non-discrimination covenants, City of Fort Lauderdale will there upon revert to and vest in and become the absolute property of City of Fort Lauderdale and its assigns.\*

(\*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

### **C. OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970**

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (29 CFR Part 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

### **D. CERTIFICATION REGARDING DOMESTIC PREFERENCES FOR PROCUREMENTS**

The Bidder or Offeror certifies by signing and submitting this bid or proposal that, to the greatest extent practicable, the Bidder or Offeror has provided a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including, but not limited to, iron, aluminum, steel, cement, and other manufactured products) in compliance with 2 CFR § 200.322.



City of Fort Lauderdale Procurement Services Division  
101 NE 3<sup>rd</sup> Avenue, Suite 1650, Fort Lauderdale, Florida 33301  
954-828-5933 Fax 954-828-5576  
[purchase@fortlauderdale.gov](mailto:purchase@fortlauderdale.gov)

**ADDENDUM NO. 10**  
ITB Event 302 – AES Facility Expansion  
December 13, 2024

This addendum is issued to make the following changes:

**1. Additional Form:**

The Questionnaire Sheet appears to have been unintentionally left out from the Required Forms package and is hereby added to Attachments.

All other terms, conditions, and specifications remain unchanged.

Dylan Kenedy  
Senior Procurement Specialist

Company Name: \_\_\_\_\_  
Bidder's Signature: \_\_\_\_\_  
Date: \_\_\_\_\_

**QUESTIONNAIRE SHEET**

PLEASE PRINT OR TYPE:

Firm Name: President 

Business Address:

Telephone: 

Fax:

E-Mail Address:

What was the last project of this nature which you completed? Include the year, description, and contract value.

The following are named as three corporations and representatives of those corporations for which you have performed work similar to that required by this contract, and which the City may contact as your references (include addresses, telephone numbers and e-mail addresses). Include the project name, year, description, and contract value.

<input type="text"/>
<input type="text"/>
<input type="text"/>

How many years has your organization been in business? 

Have you ever failed to complete work awarded to you; if so, where and why?

The name of the qualifying agent for the firm and his position is: Certificate of Competency Number of Qualifying Agent: Effective Date:  Expiration Date: Licensed in: Engineering Contractor's License #   
(County/State)Expiration Date:



**NOTE: To be considered for award of this contract, the bidder must submit a financial statement upon request.**

**NOTE: Contractor must have proper licensing and shall provide copy of same with his proposal.**

### QUESTIONNAIRE SHEET

1. Have you personally inspected the proposed work and have you a complete plan for its performance?

2. Will you sublet any part of this work? If so, list the portions or specialties of the work that you will.

a)

b)

c)

d)

e)

f)

g)

3. What equipment do you own that is available for the work?

4. What equipment will you purchase for the proposed work?

5. What equipment will you rent for the proposed work?