OCSD Construction Program VI

Jacobs/Titan – A Joint Venture
School District of Okaloosa County Program Office
4008 Legendary Drive, Suite 600, Destin, FL 32541
850.897.8125 Fax: 850.897.0123

Construction Package 635C

Destin Elementary School 3/4/5 Center

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CONSTRUCTION PACKAGE 635C
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DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER

GENERAL CONTRACTING PACKAGE

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DIVISION 1 Cont.	**GENERAL REQUIREMENTS Cont.**
014535	Structural Inspection Plan
01460	Roofing Installer's Warranty
01500	Temporary Facilities
01561	Clean Up
01600	Materials and Equipment
01631	Product Substitutions
01650	Starting of Systems
01700	Project Closeout
01730	Operations and Maintenance Data
01740	Warranties
08130	Sustainable Design Requirements
DIVISION 2	**EXISTING CONDITIONS**
020500	Minor Demolition
022500	Soil Treatment
025000	Storm Drainage
DIVISION 3	**CONCRETE**
033100	Cast-In-Place Concrete
034100	Precast Structural Concrete
DIVISION 4	**MASONRY**
042000	Unit Masonry
042113	Brick Masonry
DIVISION 5	**METALS**
051200	Structural Steel Framing
052100	Steel Joists
053100	Steel Decking
054000	Cold-Formed Metal Framing
054400	Cold-Formed Metal Trusses
055113	Metal Pan Stairs
055213	Pipe and Tube Railings
057300	Decorative Metal Railings
DIVISION 6	**WOOD AND PLASTIC**
061000	Rough-Carpentry
064113	Wood-Veneer-Faced Architectural Cabinets
064116	Plastic-Laminate-Faced Architectural Cabinets
DIVISION 7	**THERMAL AND MOISTURE PROTECTION**
072100	Building-Insulation
072200	Roof and Deck Insulation
072413	Exterior Insulation and Stucco System
072700	Firestopping-And-Smokestopping
072726	Fluid-Applied Membrane Air Barriers
073010	Ice-Water-Shield

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DIVISION 7 Cont.	**THERMAL AND MOISTURE PROTECTION Cont.**
074120	Preformed Metal Roofing
074213.23	Metal Composite Material Column Covers
076000	Flashing and Sheet Metal
079000	Joint Sealers
DIVISION 8	**DOORS AND WINDOWS**
081100	Steel-Doors-And-Frames
081113	Hollow Metal Doors and Frames
082110	Flush-Wood-Doors
084113	Aluminum-Framed Entrances And Storefronts
085200	Out Swinging Aluminum Window
087110	Door-Hardware
088000	Glazing
DIVISION 9	**FINISHES**
092600	Gypsum-Board-Assemblies
093000	Tiling
093010	Marble-Window-Stools
095123	Acoustical Tile Ceilings
095126	Linear Veneered Open Wood Ceilings
095200	Acoustical-Wall-Panels
095436	Suspended Decorative Grids
096513	Resilient Base and Accessories
096519	Resilient Tile Flooring
096536	Static Control Resilient Flooring
096710	Epoxy-Floor-Coating
096766	Fluid Applied Athletic Flooring
096800	Carpet
096813	Tile Carpeting
098433	Sound Absorbing Wall Units
099000	Painting
DIVISION 10	**SPECIALTIES**
100000	Water-Based Fire-Suppression Systems
101000	Visual-Display-Boards
101600	Toilet-Partitions
102010	Louvers
102600	Wall Corner Guards
103500	Flag-Pole
104250	Signs-Interior
104260	Signs-Exterior
104413	Fire Extinguisher Cabinets
104416	Fire Extinguishers
105200	Fire-Protection-Specialties
105290	Hangers and Supports for Fire-Suppression Piping and Equipment
105230	General-Duty Valves or Water-Based Fire-Suppression Piping

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DIVISION 10	**SPECIALTIES Continued**
105300	Aluminum-Walkway-Canopy
105530	Identification for Fire-Suppression Piping and Equipment
108000	Commissioning of Fire Suppression
108001	Toilet-And-Bath-Accessories
DIVISION 11	**EQUIPMENT**
116623	Gymnasium Equipment
DIVISION 12	**FURNISHINGS**
122413	Roller Window Shades
DIVISION 13	**SPECIAL CONSTRUCTION**
139000	Addressable Fire-Alarm Systems
DIVISION 14	**CONVEYANCE SYSTEMS**
142400	Hydraulic Elevators
DIVISION 15	**MECHANICAL/PLUMBING**
150100	Mechanical General Requirements
151900	Mechanical Identification
152610	Piping Insulation
152910	Ductwork Insulation
154480	Escutcheons for Plumbing Piping
154490	Commercial Lavatories
154500	Commercial Sinks
154510	Sleeves and Sleeve Seals for Plumbing Piping
154520	Ball Valves for Plumbing Piping
154530	Plumbing Piping Insulation
154540	Domestic Water Piping
154550	Domestic Water Piping Specialties
154560	Sanitary Waste and Vent Piping
154570	Electric, Domestic-Water Heaters
154580	Commercial Water Closets
154590	Drinking Fountains
156720	Air Cooled Heat Pump Unit
157870	Ductless Split
158700	Power Ventilators
158550	AHUs
158910	Ductwork
159100	Ductwork Accessories
159400	Air Outlets and Inlets
159720	Instrumentation and Control for HVAC
159900	Test and Balance

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ATTACHMENT A

SCOPE OF WORK

SCHOOL BOARD of OKALOOSA COUNTY
DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER

General Contracting Package

The **General Contracting Package** consists of project(s) at the following locations owned by the Okaloosa County School Board:

Destin Elementary School: 630 Kelly St, Destin, FL 32541

This project consists of a two story, thirty (30) classroom addition at Destin Elementary on the grounds of the current school. This addition will house 3rd, 4th, and 5th grade students and also includes a Multi-Purpose Room and Administrative Suite that will serve the entire campus. A stand-alone Restroom / Teacher's Lounge / Storage building will also be provided that is easily accessible from the main campus and is specifically designed to serve the existing Cafetorium during public events and student use during regular school hours. A new drop-off/pickup roadway will be provided on land recently purchased by the District that is directly adjacent and South of the addition. This will relieve the existing traffic issues associated with the current drop-off road configuration. Additional parking will also be provided for staff and visitors to the school. Sitework includes construction of all required walkways with requisite canopies, a new PE pavilion and relocated/new playground that will be established once the project is complete and portables are removed.

The Contractor shall provide all labor, materials, all testing (except forensic), general condition items (temporary facilities), and equipment necessary and shall be responsible for the completion of the entire construction package as described. The Contractor must perform the Work in accordance with the project plans and specifications and in no way does this general scope relieve the Contractor from the obligations required by the Contract Documents. All work is to comply with the rules and regulations of governing bodies having jurisdiction. Work shall be performed by skilled tradesmen having experience in performing the work. Each Contractor is responsible to review the site and be familiar with all existing conditions within. Each Contractor shall field-verify dimensions, materials and conditions. Initial Layout to establish control points and grades will be performed by others and provided to the Contractor. The Contractor is responsible for all detailed layout, lines and grades from the indicated benchmark and control points required for proper location and coordination of work described and shall be responsible for maintaining control points and grades after the initial lay-out. All references in the Specification for direction from the Architect, Engineer of Owner should come through the TPM (Jacobs/Titan). Any conflicting assignment of work between the specifications, notes on the drawings and direction from the TPM work scope the TPM work scope will prevail.

General Contractors shall include all conduit, junction boxes, outlet boxes, bushings, and pull strings for all structured cabling, fire alarm wiring, and camera wiring.

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Equipment Purchased via Owner Direct Purchase (ODP)

1. Base Bid shall include all costs related to the receiving, off-loading, hoisting, placement and installation of the following owner purchased equipment, as identified on the drawings and as specified in the Project Specifications:

   - N/A

2. Base Bid shall also include all materials not supplied by the above listed manufacturers. The manufacturers will deliver equipment provided by the manufacturers listed above to the site. The material delivery dates will be coordinated between the manufacturer/supplier and the General Contractor. It will be the responsibility of the General Contractor to off load the materials at an area designated by the TPM. All hoisting/placing of equipment will be the responsibility of the General Contractor. The General Contractor is responsible for securing all equipment upon delivery and verification of all equipment provided by the manufacturers.

Alternates

Alternate No. 1: Builders Risk. Deduct if TPM or Owner provides Builder's Risk Insurance outlined in Section 9.2.3 of the Contract for Construction Services.

END OF WORK SCOPE

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ATTACHMENT B

DRAWING LIST

SCHOOL BOARD of OKALOOSA COUNTY

DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER

DRAWING NUMBER	GENERAL	DATE
G-001	TITLE SHEET	10/10/2024
G-002	INDEX OF DRAWINGS	10/10/2024
G-003	VICINITY AND SCHOOL CAMPUS MAP	10/10/2024
	LIFE SAFETY	
LS001	CODE COMPLIANCE SUMMARY AND LIFE SAFETY LEGEND	10/10/2024
LS101	PARTIAL FIRST FLOOR LIFE SAFETY PLAN	10/10/2024
LS102	PARTIAL FIRST FLOOR LIFE SAFETY PLAN	10/10/2024
LS103	PARTIAL FIRST FLOOR LIFE SAFETY PLAN	10/10/2024
LS104	PARTIAL SECOND FLOOR LIFE SAFETY PLAN	10/10/2024
LS105	PARTIAL SECOND FLOOR LIFE SAFETY PLAN	10/10/2024
	CIVIL	
C-100	EXISTING SITE, DEMOLITION, & EROSION CONTROL PLAN	10/10/2024
C-101	EROSION CONTROL DETAILS	10/10/2024
C-200	OVERALL SITE LAYOUT	10/10/2024
C-201	ENLARGED SITE LAYOUT & DIMENSION PLAN	10/10/2024
C-202	ENLARGED SITE LAYOUT & DIMENSION PLAN	10/10/2024
C-203	SITE DETAILS	10/10/2024
C-300	GRADING AND DRAINAGE PLAN	10/10/2024
C-301	GRADING AND DRAINAGE PLAN	10/10/2024
C-302	DRAINAGE DETAILS	10/10/2024
C-400	UTILITY PLAN	10/10/2024
C-401	UTILITY PLAN	10/10/2024
C-402	UTILITY DETAILS	10/10/2024
	LANDSCAPE	
LP1	LANDSCAPE PLAN	10/10/2024
LP2	LANDSCAPE PLAN	10/10/2024
	STRUCTURAL	
S-001	GENERAL NOTES	10/10/2024
S-002	WIND PRESSURES & LOADING	10/10/2024
S-002A	WIND PRESSURES	10/10/2024
S-003	SPECIAL INSPECTION REQ'S	10/10/2024
S-004	STRUCTURAL DETAIL(S)	10/10/2024
S-005	STRUCTURAL SECTION(S)	10/10/2024
S-006	STRUCTURAL DETAIL(S)	10/10/2024

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DRAWING NUMBER	STRUCTURAL Continued	DATE
S-007	STRUCTURAL DETAIL(S)	10/10/2024
S-100	OVERALL FOUNDATION PLAN	10/10/2024
S-101	FOUNDATION PLAN A	10/10/2024
S-102	FOUNDATION PLAN B1	10/10/2024
S-103	FOUNDATION PLAN B2	10/10/2024
S-104	FOUNDATION PLAN C	10/10/2024
S-105	FOUNDATION PLAN D	10/10/2024
S-110	OVERALL 2ND FLOOR FRAMING PLAN	10/10/2024
S-111	2ND FLOOR FRAMING PLAN A	10/10/2024
S-112	2ND FLOOR FRAMING PLAN B1	10/10/2024
S-113	2ND FLOOR FRAMING PLAN B2	10/10/2024
S-120	OVERALL ROOF FRAMING PLAN	10/10/2024
S-121	ROOF FRAMING PLAN A	10/10/2024
S-122	ROOF FRAMING PLAN B1	10/10/2024
S-123	ROOF FRAMING PLAN B2	10/10/2024
S-124	ROOF FRAMING PLAN C	10/10/2024
S-125	ROOF FRAMING PLAN D	10/10/2024
S-200	MASONRY CONTROL JOINT ELEVATIONS	10/10/2024
S-201	STRUCTURAL BEAM TO WALL CONNECTION(S)	10/10/2024
S-210	STRUCTURAL SECTION(S)	10/10/2024
S-211	STRUCTURAL SECTION(S)	10/10/2024
S-212	STRUCTURAL SECTION(S)	10/10/2024
S-213	PRECAST STAIR PLAN & DETAILS	10/10/2024
S-220	STRUCTURAL ELEVATION(S)	10/10/2024
S-221	STRUCTURAL ELEVATION(S)	10/10/2024
S-222	STRUCTURAL ELEVATION(S)	10/10/2024
S-300	CONCRETE DETAILS	10/10/2024
S-301	CONCRETE DETAILS	10/10/2024
S-400	MASONRY DETAILS	10/10/2024
S-401	MASONRY DETAILS	10/10/2024
S-500	STRUCTURAL STEEL DETAILS	10/10/2024
S-501	STRUCTURAL STEEL DETAILS	10/10/2024
S-502	STRUCTURAL STEEL DETAILS	10/10/2024
S-900	LOUNGE FOUNDATION & ROOF FRAMING PLANS	10/10/2024
S-901	MISC. SITE DETAILS	10/10/2024
	ARCHITECTURAL	
A-001	LEGEND, NOTES, AND ABBREVIATIONS	10/10/2024
A-002	WALL TYPES	10/10/2024
A-100	PARTIAL SITE PLAN	10/10/2024
A-101	OVERALL FIRST FLOOR PLAN	10/10/2024
A-102	OVERALL SECOND FLOOR PLAN	10/10/2024
A-103	TEACHER LOUNGE - RESTROOM FLOOR PLAN	10/10/2024
A-104	PARTIAL FIRST FLOOR PLAN - AREA A	10/10/2024
A-105	PARTIAL FIRST FLOOR PLAN - AREA B	10/10/2024
A-106	PARTIAL FIRST FLOOR PLAN - AREA C & D	10/10/2024
A-107	PARTIAL SECOND FLOOR PLAN - AREA A	10/10/2024
A-108	PARTIAL SECOND FLOOR PLAN - AREA B	10/10/2024

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DRAWING NUMBER	ARCHITECTURAL Continued	DATE
A-109	PARTIAL SECOND FLOOR PLAN - AREA C	10/10/2024
A-111	PARTIAL FIRST FLOOR DIMENSION PLAN - AREA A	10/10/2024
A-112	PARTIAL FIRST FLOOR DIMENSION PLAN - AREA B	10/10/2024
A-113	PARTIAL FIRST FLOOR DIMENSION PLAN - AREA C & D	10/10/2024
A-114	PARTIAL SECOND FLOOR DIMENSION PLAN - AREA A	10/10/2024
A-115	PARTIAL SECOND FLOOR DIMENSION PLAN - AREA B	10/10/2024
A-116	PARTIAL SECOND FLOOR DIMENSION PLAN - AREA C	10/10/2024
A-120	PARTIAL FIRST FLOOR REFLECTED CEILING PLAN - AREA A	10/10/2024
A-121	PARTIAL FIRST FLOOR REFLECTED CEILING PLAN - AREA B	10/10/2024
A-122	PARTIAL FIRST FLOOR REFLECTED CEILING PLAN - AREA C & D	10/10/2024
A-123	PARTIAL SECOND FLOOR REFLECTED CEILING PLAN - AREA A	10/10/2024
A-124	PARTIAL SECOND FLOOR REFLECTED CEILING PLAN - AREA B	10/10/2024
A-125	PARTIAL SECOND FLOOR REFLECTED CEILING PLAN - AREA C	10/10/2024
A-140	ROOF PLAN	10/10/2024
A-201	EXTERIOR ELEVATIONS	10/10/2024
A-202	ENLARGED EXTERIOR ELEVATIONS	10/10/2024
A-203	ENLARGED EXTERIOR ELEVATIONS	10/10/2024
A-204	EXTERIOR ELEVATIONS - TEACHER LOUNGE AND RESTROOM	10/10/2024
A-301	BUILDING SECTIONS	10/10/2024
A-302	BUILDING SECTIONS	10/10/2024
A-303	BUILDING SECTIONS	10/10/2024
A-304	BUILDING SECTIONS	10/10/2024
A-305	BUILDING SECTIONS	10/10/2024
A-310	WALL SECTIONS	10/10/2024
A-311	WALL SECTIONS	10/10/2024
A-312	WALL SECTIONS	10/10/2024
A-313	WALL SECTIONS	10/10/2024
A-314	WALL SECTIONS	10/10/2024
A-401	ENLARGED PLANS	10/10/2024
A-402	ENLARGED PLANS	10/10/2024
A-403	ENLARGED PLANS	10/10/2024
A-404	ENLARGED PLANS	10/10/2024
A-405	ENLARGED PLANS	10/10/2024
A-410	CASEWORK ELEVATIONS	10/10/2024
A-411	CASEWORK ELEVATIONS	10/10/2024
A-412	CASEWORK ELEVATIONS	10/10/2024
A-413	CASEWORK ELEVATIONS	10/10/2024
A-414	CASEWORK ELEVATIONS	10/10/2024
A-421	CASEWORK SECTIONS	10/10/2024
A-422	CASEWORK SECTIONS	10/10/2024
A-430	ENLARGED STAIR PLANS AND DETAILS	10/10/2024
A-431	ENLARGED STAIR PLANS AND DETAILS	10/10/2024
A-501	ROOF DETAILS	10/10/2024
A-502	ROOF DETAILS	10/10/2024
A-503	ROOF DETAILS	10/10/2024
A-510	PLAN DETAILS	10/10/2024
A-511	PLAN DETAILS	10/10/2024
A-512	DETAILS	10/10/2024

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DRAWING NUMBER	ARCHITECTURAL Continued	DATE
A-601	DOOR SCHEDULE	10/10/2024
A-602	DOOR SCHEDULE	10/10/2024
A-603	DOOR SCHEDULE	10/10/2024
A-610	STOREFRONT ELEVATIONS	10/10/2024
A-611	STOREFRONT ELEVATIONS	10/10/2024
A-612	STOREFRONT ELEVATIONS	10/10/2024
A-620	DOOR DETAILS	10/10/2024
A-621	DOOR DETAILS	10/10/2024
A-622	OPENING DETAILS	10/10/2024
A-623	OPENING DETAILS	10/10/2024
	INTERIOR DESIGN	
I-100	OVERALL FIRST FLOOR PLAN	10/10/2024
I-101	FINISH PLAN FIRST FLOOR - AREA A	10/10/2024
I-102	FINISH PLAN FIRST FLOOR - AREA B	10/10/2024
I-103	FINISH PLAN FIRST FLOOR - AREAS C& D	10/10/2024
I-104	TEACHERS LOUNGE	10/10/2024
I-105	SIGNAGE PLAN FIRST FLOOR - AREA A	10/10/2024
I-106	SIGNAGE PLAN FIRST FLOOR - AREA B	10/10/2024
I-107	SIGNAGE PLAN FIRST FLOOR - AREAS C&D	10/10/2024
I-200	OVERALL SECOND FLOOR PLAN	10/10/2024
I-201	FINISH PLAN SECOND FLOOR - AREA A	10/10/2024
I-202	FINISH PLAN SECOND FLOOR - AREA B	10/10/2024
I-203	SIGNAGE PLAN SECOND FLOOR - AREA A	10/10/2024
I-204	SIGNAGE PLAN SECOND FLOOR - AREA B	10/10/2024
I-601	FINISH SCHEDULE	10/10/2024
I-602	COLOR LEGEND - FINISH NOTES	10/10/2024
I-603	SIGNAGE SCHEDULE AND TYPES	10/10/2024
I-604	SIGNAGE SCHEDULE	10/10/2024
I-605	INTERIOR ELEVATIONS & DETAILS	10/10/2024
	FIRE PROTECTION	
F-001	ERCES GENERAL NOTES	10/10/2024
FA001	FIRE ALARM GENERAL NOTES	10/10/2024
FA002	FIRE ALARM SYSTEM MATRIX	10/10/2024
FA101	PARTIAL FIRST FLOOR FIRE ALARM NEW WORK PLAN	10/10/2024
FA102	PARTIAL FIRST FLOOR FIRE ALARM NEW WORK PLAN	10/10/2024
FA103	PARTIAL FIRST FLOOR FIRE ALARM NEW WORK PLAN	10/10/2024
FA104	PARTIAL SECOND FLOOR FIRE ALARM NEW WORK PLAN	10/10/2024
FA105	PARTIAL SECOND FLOOR FIRE ALARM NEW WORK PLAN	10/10/2024
FX001	FIRE SUPPRESSION GENERAL NOTES	10/10/2024
FX101	PARTIAL FIRST FLOOR FIRE SPRINKLER NEW WORK PLAN	10/10/2024
FX102	PARTIAL FIRST FLOOR FIRE SPRINKLER NEW WORK PLAN	10/10/2024
FX103	PARTIAL FIRST FLOOR FIRE SPRINKLER NEW WORK PLAN	10/10/2024
FX104	PARTIAL SECOND FLOOR FIRE SPRINKLER NEW WORK PLAN	10/10/2024
FX105	PARTIAL SECOND FLOOR FIRE SPRINKLER NEW WORK PLAN	10/10/2024

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DRAWING NUMBER	PLUMBING	DATE
P-101	PARTIAL 1ST FLOOR PLUMBING PLAN - WASTE - AREA A	10/10/2024
P-102	PARTIAL 1ST FLOOR PLUMBING PLAN & ENLARGED RESTROOM PLAN - WASTE - AREA B	10/10/2024
P-103	PARTIAL 1ST FLOOR PLUMBING PLAN - WASTE - AREA C	10/10/2024
P-104	PARTIAL 1ST FLOOR PLUMBING PLAN - WASTE - AREA D & TEACHERS LOUNGE	10/10/2024
P-105	PARTIAL 2ND FLOOR PLUMBING PLAN - WASTE - AREA A	10/10/2024
P-106	PARTIAL 2ND FLOOR PLUMBING PLAN - WASTE - AREA B	10/10/2024
P-107	PARTIAL 1ST FLOOR PLUMBING PLAN - WATER - AREA A	10/10/2024
P-108	PARTIAL 1ST FLOOR PLUMBING PLAN & ENLARGED RESTROOM PLAN - WATER - AREA B	10/10/2024
P-109	PARTIAL 1ST FLOOR PLUMBING PLAN - WATER - AREA C	10/10/2024
P-110	PARTIAL 1ST FLOOR PLUMBING PLAN - WATER - AREA D & TEACHERS LOUNGE	10/10/2024
P-111	PARTIAL 2ND FLOOR PLUMBING PLAN - WATER - AREA A	10/10/2024
P-112	PARTIAL 2ND FLOOR PLUMBING PLAN - WATER - AREA B	10/10/2024
P-601	WASTE AND VENT RISER DIAGRAM - 1ST AND 2ND FLOOR - AREA A	10/10/2024
P-602	WASTE AND VENT RISER DIAGRAM - 1ST AND 2ND FLOOR - AREA B	10/10/2024
P-603	WASTE AND VENT RISER DIAGRAM - AREA C & D AND TEACHERS LOUNGE	10/10/2024
P-604	PLUMBING SCHEDULES, GENERAL NOTES, LEGEND AND DETAIL	10/10/2024
	MECHANICAL	
M-001	GENERAL MECHANICAL NOTES, LEGEND AND ABBREVIATIONS	10/10/2024
M-101	PARTIAL FIRST FLOOR MECHANICAL NEW WORKPLAN - AREA A	10/10/2024
M-102	PARTIAL FIRST FLOOR MECHANICAL NEW WORKPLAN - AREA B	10/10/2024
M-103	PARTIAL FIRST FLOOR MECHANICAL NEW WORKPLAN - AREA C	10/10/2024
M-104	PARTIAL FIRST FLOOR MECHANICAL NEW WORKPLAN - AREA D	10/10/2024
M-105	PARTIAL SECOND FLOOR MECHANICAL NEW WORKPLAN - AREA A	10/10/2024
M-106	PARTIAL SECOND FLOOR MECHANICAL NEW WORKPLAN - AREA B	10/10/2024
M-107	MECHANICAL NEW WORK PLAN - TEACHER LOUNGE/STORAGE/RESTROOM BLDG	10/10/2024
M-501	MECHANICAL DETAILS	10/10/2024
M-601	MECHANICAL SCHEDULES AIR HANDLER UNITS	10/10/2024
M-602	MECHANICAL SCHEDULES HEAT PUMPS AND CONTROL SEQUENCES	10/10/2024
M-603	MECHANICAL SCHEDULES AND DIAGRAMS	10/10/2024
	ELECTRICAL	
E-001	ELECTRICAL LEGEND & GENERAL NOTES	10/10/2024
E-101	FIRST FLOOR PLAN – POWER AREA “A”	10/10/2024
E-102	FIRST FLOOR PLAN – POWER AREA “B”	10/10/2024
E-103	FIRST FLOOR PLAN – POWER AREA “C”	10/10/2024
E-104	FIRST FLOOR PLAN – POWER AREA “D”	10/10/2024

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DRAWING NUMBER	ELECTRICAL Continued	DATE
E-105	SECOND FLOOR PLAN – POWER AREA “A”	10/10/2024
E-106	SECOND FLOOR PLAN – POWER AREA “B”	10/10/2024
E-107	TEACHERS LOUNGE FLOOR PLAN – POWER	10/10/2024
E-111	FIRST FLOOR PLAN – MECHINAL POWER AREA “A”	10/10/2024
E-112	FIRST FLOOR PLAN – MECHINAL POWER AREA “B”	10/10/2024
E-113	FIRST FLOOR PLAN – MECHINAL POWER AREA “D”	10/10/2024
E-114	SECOND FLOOR PLAN – MECHINAL POWER AREA “A”	10/10/2024
E-115	SECOND FLOOR PLAN – MECHINAL POWER AREA “B”	10/10/2024
E-116	TEACHERS LOUNGE FLOOR PLAN – MECHANICAL POWER	10/10/2024
E-121	FIRST FLOOR PLAN LIGHTING AREA “A”	10/10/2024
E-122	FIRST FLOOR PLAN LIGHTING AREA “B”	10/10/2024
E-123	FIRST FLOOR PLAN LIGHTING AREA “C”	10/10/2024
E-124	FIRST FLOOR PLAN LIGHTING AREA “D”	10/10/2024
E-125	SECOND FLOOR PLAN LIGHTING AREA “A”	10/10/2024
E-126	SECOND FLOOR PLAN LIGHTING AREA “B”	10/10/2024
E-127	TEACHERS LOUNGE FLOOR PLAN – LIGHTING	10/10/2024
E-401	ELECTRICAL SITE PLAN – DEMOLITION	10/10/2024
E-402	ELECTRICAL SITE PLAN – NEW WORK	10/10/2024
E-403	ELECTRICAL SITE PLAN – NEW WORK	10/10/2024
E-501	LIGHTING FIXTURE SCHEDULE	10/10/2024
E-502	LIGHTING FIXTURE SCHEDULE	10/10/2024
E-503	LIGHTING FIXTURE SCHEDULE	10/10/2024
E-504	DETAILS	10/10/2024
E-505	DETAILS	10/10/2024
E-506	DETAILS	10/10/2024
E-507	DETAILS	10/10/2024
E-601	FIRST FLOOR - POWER RISER DIAGRAM	10/10/2024
E-602	SECOND FLOOR - POWER RISER DIAGRAM	10/10/2024
E-603	GROUNDING RISER DIAGRAM	10/10/2024
E-604	PANEL SCHEDULES	10/10/2024
E-605	PANEL SCHEDULES	10/10/2024
E-606	PANEL SCHEDULES	10/10/2024
E-607	PANEL SCHEDULES	10/10/2024
E-608	PANEL SCHEDULES	10/10/2024
E-609	PANEL SCHEDULES	10/10/2024
E-610	PANEL SCHEDULES	10/10/2024
E-611	PANEL SCHEDULES	10/10/2024
E-612	PANEL SCHEDULES	10/10/2024
E-613	PANEL SCHEDULES	10/10/2024
	TELECOMMUNICATIONS	
T-001	LEGEND	10/10/2024
T-002	NOTES	10/10/2024
T-011	SITE PLAN - TELECOMMUNICATIONS	10/10/2024
T-111	OVERALL FIRST FLOOR PLAN – TELECOMMUNICATIONS (SCHOOL)	10/10/2024
T-112	PARTIAL FIRST FLOOR PLAN – TELECOMMUNICATIONS AREA “A” (SCHOOL)	10/10/2024

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DRAWING NUMBER	TELECOMMUNICATIONS Continued	DATE
T-113	PARTIAL FIRST FLOOR PLAN – TELECOMMUNICATIONS AREA “B” (SCHOOL)	10/10/2024
T-114	PARTIAL FIRST FLOOR PLAN – TELECOMMUNICATIONS AREA “C” (SCHOOL)	10/10/2024
T-115	PARTIAL FIRST FLOOR PLAN – TELECOMMUNICATIONS AREA “D” (SCHOOL)	10/10/2024
T-116	FLOOR PLAN – TELECOMMUNICATIONS (TEACHERS LOUNGE)	10/10/2024
T-121	OVERALL SECOND FLOOR PLAN – TELECOMMUNICATIONS (SCHOOL)	10/10/2024
T-122	PARTIAL SECOND FLOOR PLAN – TELECOMMUNICATIONS AREA “A” (SCHOOL)	10/10/2024
T-123	PARTIAL SECOND FLOOR PLAN – TELECOMMUNICATIONS AREA “B” (SCHOOL)	10/10/2024
T-401	ENLARGED PLANS	10/10/2024
T-501	DETAILS	10/10/2024
T-502	DETAILS	10/10/2024
T-503	DETAILS	10/10/2024
T-601	RISER DIAGRAM	10/10/2024
T-701	RACK ELEVATIONS	10/10/2024
TY001	LEGEND	10/10/2024
TY111	OVERALL FIRST FLOOR – SECURITY (SCHOOL)	10/10/2024
TY112	PARTIAL FIRST FLOOR PLAN – SECURITY AREA “A” (SCHOOL)	10/10/2024
TY113	PARTIAL FIRST FLOOR PLAN – SECURITY AREA “B” (SCHOOL)	10/10/2024
TY114	PARTIAL FIRST FLOOR PLAN – SECURITY AREA “C” (SCHOOL)	10/10/2024
TY115	PARTIAL FIRST FLOOR PLAN – SECURITY AREA “D” (SCHOOL)	10/10/2024
TY116	FLOOR PLAN – SECURITY (TEACHERS LOUNGE)	10/10/2024
TY121	OVERALL SECOND FLOOR PLAN – SECURITY (SCHOOL)	10/10/2024
TY122	PARTIAL SECOND FLOOR PLAN – SECURITY AREA “A” (SCHOOL)	10/10/2024
TY123	PARTIAL SECOND FLOOR PLAN – SECURITY AREA “B” (SCHOOL)	10/10/2024
TY501	DETAILS	10/10/2024
TY601	RISER DIAGRAMS	10/10/2024
	AUDIO VISUAL	
AV100	AV 1ST FLOOR PLAN	10/10/2024
AV200	AV 1ST FLOOR REFLECTED CEILING PLAN	10/10/2024
AV300	AV SECTIONS & ELEVATIONS - 1	10/10/2024
AV301	AV SECTIONS & ELEVATIONS - 2	10/10/2024
AV302	AV SECTIONS & ELEVATIONS - 3	10/10/2024
AV303	AV SECTIONS & ELEVATIONS - 4	10/10/2024
AV400	AV SYSTEM SCHEMATIC - PART 1	10/10/2024

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ATTACHMENT C
PROHIBITION AGAINST CONTINGENT FEES

_____ warrants that it has not employed or retained any company or person other than a bona fide employee working solely for _____ to solicit or secure this Contract and that _____ has not paid or agreed to pay any person, company, corporation, individual or firm other than a bona fide employee working solely for _____ any fee, commission, percentage, gift or other consideration contingent upon or resulting from the award or making of this Contract.

_____
Name of Contractor

_____ Date_____
Signature

_____
Title

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ATTACHMENT D

STATEMENT OF PARTICIPATION IN CONTRACTS SUBJECT TO NON-DISCRIMINATION CLAUSE

OKALOOSA COUNTY PUBLIC SCHOOLS

_____ (Contractor), shall complete the following statement by checking the appropriate boxes:

Contractor has [ ] has not [ ] participated in a previous contract subject to the non-discrimination clause prescribed by Executive Order 10925, or Executive Order 11114, or Executive Order 11246.

Contractor has [ ] has not [ ] submitted all compliance reports in connection with any such contract, due under the applicable filing requirements; and representations indicating submissions of required compliance reports signed by proposed subcontractors will be obtained prior to award of subcontracts.

If Contractor has participated previously in a contract subject to the non-discrimination clause and has not submitted compliance reports due under applicable filing requirements, Contractor shall submit a compliance report on Standard Form 100, Employee Information Report, EEO-1 prior to the award of the Contract.

_____ Date_____
Signature

_____
Title

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ATTACHMENT E

SWORN STATEMENT PURSUANT TO SECTION 287.133(3) (A), FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to the School District of Okaloosa County, Florida by_____ _____for_____, whose business address is _____ _____ and its Federal Employer Identification Number (FEIN) is _____.

2. I understand that a public entity crime as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for good or services to be provided to any public entity or any agency or political subdivision or any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that convicted or conviction as defined in Paragraph 287.133(1) (b), Florida Statutes, means a finding of guilt or conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an affiliate as defined in Paragraph 287.133(1) (a), Florida Statutes, means:

   a) A predecessor or successor of a person convicted of a public entity crime; or

   b) An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term affiliate includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership of one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a person as defined in paragraph 287.133(1) (e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United states with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term person includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

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6. Based on information and belief, the statement I have marked below is true in relation to the entity submitting this sworn statement (indicate which statement applies).

____ Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

____ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

____ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administration Hearings and Final Order entered by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list, (attach a copy of the final order).

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH I (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017 FLORIDA STATUTES FOR CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

_____
(Signature)

Sworn to and subscribed before me this _____ day of _____, 2024.

_____
Notary Public

Personally known _____

or produced identification _____

Type of identification _____

State of _____ County of _____

(Type of Identification) _____

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ATTACHMENT F

MILESTONE SCHEDULE

SCHOOL BOARD of OKALOOSA COUNTY
DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER

1.	Drawings Issued	05-November-2024
2.	Pre-Bid Meeting	21-November-2024
3.	Bid Date	12-December-2024
4.	Start Construction	02-January-2025
5.	Substantial Completion Date	15-July-2026

Contractor is encouraged to review the schedule for enhancement.

Construction in Existing Space: Contractor will have to coordinate deliveries and construction, which may require a flagman, so as to not interfere with the Owner's operation. All shutdowns will have to be submitted by the Contractor and approved by the TPM prior to any shutting down of systems. These shutdowns may have to be scheduled during nights, weekends or holidays in order to maintain a positive teaching environment. Contractor shall be afforded the greatest flexibility possible in so much as the safety and positive teaching environment is maintained during the construction process.

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Attachment G

Jacobs/Titan

Health, Safety, and Environment Requirements for Subcontractors

NOTE: For purposes of this Attachment G, all references to "Jacobs", "Jacobs Engineering Group" or "Contractor" shall mean the TPM (Jacobs/Titan, a Joint Venture) and all references to "Subcontractor" shall mean the Contractor, as defined in this Contract for Construction Services.

Revision 0

June 2020

Health, Safety, and Environment Requirements
For Subcontractors

Table of Contents

SUBCONTRACTOR HEALTH, SAFETY AND ENVIRONMENT REQUIREMENTS

It is a contractual requirement that Subcontractor comply with all applicable Jacobs, Client, state/province, local, and national health, safety, and environmental requirements and regulations. Subcontractor is responsible for reviewing Jacobs Health, Safety and Environment (HSE) program to gap differences, develop a mitigation plan and raise potential issues with implementation prior to starting work.

This Attachment specifies Jacobs' HSE requirements that may exceed national, state/province, or local legal standards or the Subcontractor's normal HSE procedures. **Subcontractor is responsible for reviewing and implementing the HSE requirements set forth in this Attachment.**

LOWER-TIER SUBCONTRACTORS

Subcontractor shall comply with and secure the compliance of its employees, Lower Tier Subcontractors, agents with applicable laws, its HSE plan and those of Jacobs, if any, and with the reasonable recommendations of insurance companies having an interest in the project. Subcontractor agrees to perform a health, safety and environmental pre-qualification of all Lower Tier Subcontractors prior to contract award, including but not limited to, hazardous material and hazardous waste transport and disposal subcontractors. Pre-qualification records shall be maintained by the Subcontractor and shall be readily available for inspection. Lower-tier subcontractors/suppliers must show their ability to comply with health, safety and environmental requirements by completing a written questionnaire outlining their HSE program components, incident history, regulatory compliance and training programs for the previous 3 years. Subcontractor shall not accept Lower Tier Subcontractors that have fatalities, incident statistics with a TRIR >3, workers' compensation experience modification rates (EMR) greater than 1.0 (for USA contracts only), or inadequate training programs for the anticipated scope of work. Subcontractors who use Lower Tier Subcontractors that do not meet these prequalification criteria shall notify Jacobs for concurrence to use of the Lower Tier Subcontractors, prior to working on the project.

DEFINITIONS

Incident	An unplanned event resulting in or having the potential to result in personal injury or illness, property damage, and/or environmental damage resulting from spill, release, or permit or environmental regulatory noncompliance event.
HSE Professional	This is a generic term that may be used to include a worker with a minimum of 3-5 years' experience whose full-time job is the execution of HSE related tasks, e.g., Manager of HSE, HSE Supervisor, Safety Supervisor, Environmental Manager, etc.
Competent Person	An individual who has sufficient training and experience or knowledge and other qualities to achieve the desired results. The level of competence required will depend on the complexity of the situation and the particular task.
Safe System of Work	A fit-for-purpose plan or procedure that identifies all potential hazards/impacts and control measures or safe work methods necessary to minimize risk, for each task undertaken within the scope of works.
Risk Assessment	Identification and evaluation of the task risks, and a review of the task hazards, environmental aspects/impacts, and control measures.
Subcontractor	Goods and service providers, including Suppliers, Lessors, and Subconsultants. For the purposes of this document this definition applies only to suppliers (including lower tier suppliers) directly contracted to Jacobs who undertake field or site-based activities. Field or Site based activities also includes office refurbishment and maintenance.
Site/Project Manager	The Jacobs employee responsible for overall project execution, including but not limited to implementation of the project's HSE and Quality programs. The Project Manager's office may or may not be located at the

	project site. In some circumstances, the Project Manager and the Site Manager is the same person.
Beyond Zero Observation (BZO)	The BZO is a proactive process designed to identify and document HSE-related acts and conditions in the work environment.
Daily Safety Meeting	A review of the SSoW among the crew and supervisor to discuss and resolve any HSE issues before work is initiated, continued, when there has been a break in the work schedule, change in work or site conditions, change in crew, etc.
Scope of Work	Describes all elements of work associated with the project including the agreed upon tasks and functions within the framework of the contract, establishing the project baseline.
Waste	Non-hazardous and hazardous waste, including asbestos, PCBs, petroleum, radioactive material and any other toxic substances, in whatever form or states that is known or suspected to adversely affect the health and safety of humans or of animal or plant organisms, or which are known or suspected to impair the environment in any way whatsoever.
Visual Standards	Jacobs best practice expectations for the delivery of safe working practices on construction projects.
Temporary Works	Are the parts of a construction project that are needed to enable the permanent works to be built. Usually the Temporary Works are removed after use - e.g. access scaffolds, props, shoring, excavation support, falsework and formwork, etc.
Portable Appliance Testing (PAT)	Is the term used to describe the examination of electrical appliances and equipment to ensure they are safe to use. Most electrical safety defects can be found by visual examination, but some types of defect can only be found by testing.

WRITTEN HSE PROGRAM

A minimum of 10 days before mobilizing to the project, unless specifically waived by Jacobs, the Subcontractor shall forward to Jacobs Site/Project Management a written Health, Safety and Environment program) and/or any required compliance-specific Plans, i.e. specific environmental plans, emergency response plans, with detail commensurate with the supplier's work. Such plans shall describe anticipated hazards, environmental aspects/impacts, and provide an assessment of the risks they present with identified control methods to mitigate the risk. The Subcontractor's HSE Program must be reviewed and accepted by Jacobs prior to work commencing.

Subcontractor shall furnish to Jacobs the names and qualifications of the Competent Persons, who may be required for their scope of work by the Jacobs' safety procedures and by National, State, or local regulations. Examples include Competent Persons and/or Qualified Persons for design, steel erection, excavation, scaffold erection, confined space entry, crane and rigging operations, annual crane inspections, fall protection, including horizontal lifeline systems, asbestos and lead-based paint survey/abatement, etc.

Subcontractors will conduct HSE meetings at the frequency dictated in the PHSEP and signed copies of the meeting attendance and content reports shall be made available to the Contractor upon request.

A pre-start 'Kick off'/HSE Chartering meeting will be held between Jacobs and the Subcontractor prior to commencement of work on site; mobilization will not be approved before this meeting.

Security Requirements

Creating the SSoW requires the Supervisor to solicit crew participation in identifying hazards/impacts and control measures such as PPE, training requirement, permits, procedures, identify and protect surface water features, soil erosion and sediment control measures, etc.

Members of the team are required to sign the SSoW document to indicate their participation, their understanding of the plan, and their agreement to follow the plan.

Daily Safety Meeting

Daily Safety Meeting is a daily HSE briefing Subcontractor will provide details, which can be included in their PHSEP, of how they will secure their equipment and plant. The Subcontractor shall take all necessary precautions to ensure that no unauthorized persons are able to access tools and plant.

Any Client- or project-specific security requirements will be incorporated into the site PHSEP. Subcontractors will identify all the required resources required to implement the plan effectively.

HSE RESOURCING REQUIREMENTS

Each Subcontractor shall appoint an on-site HSE representative, who will attend regular Jacobs HSE meetings and will support implementation of the HSE program, as well as other HSE requirement(s) determined, by Jacobs, to be necessary for the safe execution of the project. Subcontractors employing 25 or more workers on the project site(s), including their Lower Tier Subcontractor employees, must provide a full-time site HSE professional. Additional site HSE personnel are required for each additional 50 workers, thereafter, including their Lower Tier Subcontractor employees, or where the risk profile of the project or operation being undertaken indicates supplemental HSE resources are required. Subcontractor shall have adequate administrative support as necessary to implement their HSE program. Jacobs shall determine appropriate qualifications for Subcontractor HSE personnel, based on project demands and reserve the right to interview candidates.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Subcontractors are responsible for the provision of all personal protective equipment (PPE) for their employees. In addition, Subcontractor shall enforce the use of PPE by its employees whenever required or specified in the PHSEP. All PPE must meet Jacobs minimum expectations and comply with National, State or local regulations. The following minimum mandatory PPE is to be worn when in the field or on site:

- Safety eyewear shall be worn at all times when on a construction site or process plant, and elsewhere when an eye hazard exists.
- Safety helmets / hard-hats shall be worn at all times when on a construction site or process plant, and elsewhere when an overhead hazard exists. Safety helmets / hard-hats will have the suppliers company logo and the employee names clearly printed on the front. Chin straps must be provided and worn for all work at height activities.
- High visibility jacket or vest with long sleeves shall be worn on site. High visibility jackets will have the suppliers company logo printed on the back.
- Mandatory hand protection. Gloves must be worn 100% of the time. Gloves must be appropriate for the task and shall be worn as determined by risk assessment.
- Long trousers (or coveralls) shall be worn on all field and construction sites.
- Safety footwear with toe/mid-sole protection and ankle support with laces.
- PPE must be in good condition and replaced when it becomes damaged or reaches its expiration date. All PPE must be subject to a formal inspection program. A record of inspections must be maintained on site. All PPE must conform to national manufacture standards.
- Additional PPE may be required depending on the project scope of work and will be specified in the project HSE Plan.
- The Subcontractor must make Provision to provide PPE for visitors. The subcontractor will make provision for PPE storage and work wear drying facilities.
- Subcontractors must ensure that their employees are trained on the use, care and maintenance of PPE.

WELFARE REQUIREMENTS

Subcontractors and their Lower Tier Subcontractors shall ensure adequate resources and facilities are made available to an acceptable standard that ensures the health, safety and welfare of its employees. Subcontractors must address fatigue management, stress, working hours, travel distances as part of their HSE planning. All local, state and national regulatory requirement with respect to welfare must be complied with in full.

Fatigue Risk Management

Subcontractors PHSEP shall include a Fatigue Risk Management plan, where applicable, outlining assessment and mitigation measures to minimize accidents due to employee fatigue prior to performing any work, which increases fatigue potential such as: extended work shift, call outs, extended work schedules or exhaustion from demanding work.

Extreme Work Environments

Subcontractors working in unusually cold or hot environments or high-altitude locations shall include extreme conditions safe detail in the PHSEP that addresses worker training, PPE, engineering and administrative controls, at a minimum

Work Alone

Lone working is not permitted. Exceptions must be approved by Jacobs only after a robust Risk Assessment (RA) and Safe System of Work (SSoW) have been completed. The SSoW must include a communication strategy and an escalation plan in case of lost communication.

Hygiene and Potable Water

Subcontractors shall be responsible for properly organizing activities to the extent possible to ensure ample refuse containers are provided and frequently emptied.
Eating is only permitted in designated facilities or areas.
Drinking water shall be from labeled potable outlets or authorized containers. Containers shall be in sanitary condition, sealed, labeled, and dated before transporting to work areas.
Subcontractor is responsible for providing designated break areas equipped with wash facilities and climate-controlled areas for cold and hot environments.
Subcontractor is responsible for having an adequate number toilet facilities. A separate facility shall be provided for female workers.

TASK PLANNING AND RISK ASSESSMENT

A Safe System of Work (SSoW) must be developed for every task. A task Risk Assessment (RA) must be undertaken and the findings used to develop a SSoWs. The SSoW must be submitted to and accepted by Jacobs Site/Project Management prior to work commencing. The Subcontractor will ensure that all the necessary resources are available and adequate to allow the works to be conducted as per Contractor, Client, National, State, and Local requirement.

No work can proceed without an approved Safe System of Work.

Safe System of Work (SSoW)

The SSoW, which includes the task RA identifies steps to execute the task, the hazards and potential environmental impacts associated with each step and mitigation measures to eliminate or minimize the hazard or impact. This helps ensure that every task receives proper HSE assessment and planning. The SSoW is developed by the crew assigned to perform the work with guidance from their Supervisor.

Daily Safety meetings shall be conducted at least daily and whenever a task presents a change of hazards or potential impacts from the previous tasks or unanticipated site conditions are encountered.

These meetings address the HSE measures specific to the tasks and associated with the task(s) that are scheduled for the crew during the work shift.

Beyond Zero Observations

The Beyond Zero Observations (BZO) is a proactive process designed to identify, address and document HSE-related acts and conditions in the work environment.

All Subcontractor supervisors are required to participate in the BZO process by generating written BZOs and submitting a weekly report illustrating results and trends to the Jacobs Site/Project Management.

The BZO allows any site worker to record observed safe or at risk HSE practices and identifies the cause of any deficiencies so that corrective action can be taken.

The SSoW, the Daily Safety Meeting, and the BZO process require each worker to receive on-the-job training from their direct Supervisor. Subcontractor employees shall also be trained and educated on their individual responsibilities contained in these tools by Jacobs after mobilization.

Work Authorization and Permitting

Certain operations may require a Jacobs, Client and/or owner permit. Such activities may include but are not limited to)

- Electrical work
- Control of Hazardous Energies
- Pressure testing
- Confined Space Entry
- Special Access to Height (roof access)
- Mobile Elevated Work Platform operation
- Excavation works
- Hot Work (any flame or spark producing activity)

The Subcontractors representative shall ask Jacobs Site/Project Management whether any parts of the Subcontractors activities require a Jacobs, Client and/or owner permit.

Some country and local authorities require permits and licensure for specific activities such as excavations, heavy lifts, asbestos/lead survey or abatement, air emission generation, water discharge permits, hazardous waste disposal, etc. Subcontractors are responsible to secure and comply with these permits and licensure requirements, unless Jacobs Site/Project Management has delegated this responsibility to others in writing.

Jacobs PHSEP will explain the permit and work authorization process that will be followed in each work location.

Failure to comply with the site permitting requirements is a serious breach of HSE protocol and the circumstances of all breaches will be investigated.

Fitness for Duty

Subcontractor shall ensure that all workers and Lower Tier Subcontractor personnel are fit to perform their work without posing a threat to the health or safety of the worker or others (whether in the workplace or general public). The Subcontractor and Lower-Tier workers may be required to undergo baseline physical and functional fitness exams, as well as a medical assessment by a certified medical practitioner. Where required, the cost to be borne by the Subcontractor.

Medical and Exposure Monitoring

Subcontractors involved with operations, such as those involving hazardous waste, asbestos or lead abatement, certain carcinogenic compounds, etc., shall describe their medical and exposure monitoring procedures and their proposed compliance methods in their PHSEP.

Personnel involved in these operations shall have met, prior to any fieldwork activity or exposure, the medical requirements of applicable regulations or standards required by National, State or local regulations, including, but not limited to, a baseline medical exam and periodic update exams, as required.

Personnel medical requirements and limitations shall be considered prior to the use of certain types of PPE, such as respirators.

VISUAL STANDARDS

Subcontractors and their Lower Tier Subcontractors will adopt Jacobs Visual Standards (Jacobs Visual Standards are a simple text and image-based communication tool to improve the

understanding of what good looks like), which will be included as an appendix in the PHSEP where applicable to the project scope of work. The visual standards should be used to assist the supplier in developing their HSE plans and SSoW. Subcontractors are required to communicate to their personnel the Visual standards that pertain to their scope of work.

ENVIRONMENTAL REQUIREMENTS

Subcontractor shall comply with the minimum environmental requirements specified in Jacobs' PHSEP. Applicable Client, country, state and local requirements, laws and regulations shall be complied with when performing all work. In the event of any inconsistency between provisions of the PHSEP and applicable requirements, laws and regulations, the more stringent requirement shall prevail.

Waste shall be transported only to the facilities specified in the Contract Documents or as directed by Client/Owner. Subcontractor acknowledges that Jacobs has had no role in generating, arranging, treating, storing or disposing of Waste associated with the Project site and shall perform Work in a manner that does not conflict with Client ownership of Waste, including but not limited to: Client selection and engagement of transport and disposal contractors; Client obtaining permits, registration or identification numbers; and Client signature on waste documentation including manifests.

Subcontractor shall provide and inspect adequate spill response equipment including spill kits prior to start of Project. Subcontractor shall immediately and at its own expense take all steps necessary to curtail any discharge, spill, release or emission of hazardous materials and to mitigate any consequences to persons, property or the environment.

HSE TRAINING/COMMUNICATION REQUIREMENTS

Subcontractor shall ensure all workers and lower-tier subcontractor personnel are competent to perform their assigned work and shall have received appropriate training before beginning Subcontractor's work at the Project site. Subcontractor employees must complete HSE training required by the PHSEP, Jacobs, Client, National, State and local HSE requirements. Such training may include, but is not limited to, a site-specific orientation, Construction Safety, Safety Leadership Training for Supervisory Personnel, ergonomics training, and plant operator training. Documentation of all HSE training shall be maintained at the project site by the Subcontractor and provided to Jacobs upon request.

Subcontractor shall instruct each employee or lower-tier subcontractor in the recognition of hazards/impacts and unsafe behaviors and the process to correct these acts or conditions related to the work environment to control or eliminate hazards/impacts or exposures to illness or injury.

Subcontractor must establish a prompt and effective method of providing HSE communications such as HSE alerts, advisories, bulletins, notification boards, regulatory updates, etc., to all site employees. Daily pre-start/tool box meetings emphasize directives, trends, and corrective actions.

Subcontractor and Lower-Tier Subcontractors are required to attend all project meetings to which they are invited by Jacobs or the Client. Meetings that the Subcontractor may be required to attend include but is not limited to the following;

- Pre-start 'Kick Off'/Chartering Meetings
- All Hands Meeting
- Daily Safety Meeting/Pre-Start/Tool Box Talk
- Weekly Progress meeting
- Incident investigation and review meetings

Subcontractors senior leadership is required to attend site HSE leadership team meetings. A schedule of these meetings is issued for each project.

Subcontractor must ensure that their meeting attendees have the authority to act on behalf of the supplier.

Subcontractor is responsible for "interpretations" for non-English, or approved project language, speaking Subcontractor personnel

TEMPORARY WORKS

Subcontractors must make provision to ensure all Temporary Works are designed and certified by a competent engineer. Provisions must also be made for inspection of Temporary Works by a competent engineer.

CONSTRUCTION PLANT AND WORK EQUIPMENT

Subcontractors must ensure all construction related plant and equipment under their control is subject to a formal inspection process as per national or local regulatory requirements. Additional inspection requirements required by Jacobs or the Client must also be provided.

A record of all inspections must be maintained on the site for review.

All plant and equipment must be labeled with a unique identifying number and suppliers company name.

Electrical Equipment

In addition to a visual inspection, prior to each use, the electrical equipment must by Portable Appliance Tested (PAT), by a competent person, at no longer than 3 monthly intervals.

PAT testing should usually include checking:

- The integrity of the cable and equipment insulation
- the correct polarity of supply cables
- the correct fusing
- effective termination of cables and cores
- that the equipment is suitable for its environment

HSE AUDITS/INSPECTIONS

Subcontractor shall conduct and document weekly inspections, or more frequently if site conditions warrant, at the Project site and promptly implement any corrective actions arising from the inspection. These site inspections will be in addition to any plant or equipment inspections applicable under National, State or local regulations.

Jacobs Site/Project Management and HSE Department shall conduct periodic HSE audits and inspections of the site, jointly with representatives from the Subcontractor(s). Any HSE discrepancy observed by Jacobs will be reported to the Subcontractor for appropriate actions (up to and including work stoppage) to be taken by the Subcontractor.

These HSE surveys do not relieve Subcontractor of their responsibility to self-inspect their work and equipment and to conduct their work in a safe and environmentally compliant manner.

IMMINENT DANGER SITUATIONS AND STOP WORK INTERVENTION

Upon discovery of any situation that may, in the opinion of Jacobs, reasonably be expected to imminently cause serious physical harm, illness, death, or significant property damage or significant environmental damage, the Subcontractor shall suspend the related work immediately, and assure workers are removed from the hazard/impact, the hazard/impact abated, and a thorough investigation conducted.

Work may resume only after the HSE concern(s) have been corrected, to the satisfaction of Jacobs. Examples of “imminent danger” situations may include, but are not limited to the following:

- Falls from elevations
- Excavations not properly sloped or shored
- Electrocution hazards
- Work activities posing injury hazards or impacts to the general public
- Operation of vehicles, machinery or heavy equipment in an unsafe manner
- Improper Lock Out/Tag Out procedures
- Improper line or equipment opening

The Subcontractor shall immediately remove any personnel or agents from the job site and from participation in any aspect of work that Jacobs determines, in its sole discretion, fails to comply with laws, regulations, site procedures, and/or is otherwise unacceptable at to have on site. The removal of any individual under this clause shall be at the expense of the Subcontractor.

All personnel at all levels have the responsibility to actively participate in the HSE process and authority to stop any task or operation, or bring to the attention of management, any unsafe acts, conditions or practices potentially harmful to others or the environment.

INCIDENT REPORTING AND INVESTIGATION

In the event of a workplace incident, Subcontractor will follow procedures in the PHSEP and/or Emergency Response Plan. The most important immediate actions are to provide medical assistance to those who may need it and to ensure the safety of others that may be affected or acting as emergency responders.

Reporting

Subcontractor must immediately report all potentially work-related incidents, incidents involving a third party, or a member of the general public (including Near Miss incidents regardless of severity) to their Supervisor or their Site HSE Representative, and the Jacobs. If medical assistance is necessary, notifications should be made after the appropriate level of medical assistance has been arranged.

Subcontractor must immediately verbally notify Contractor of spills and releases. Subcontractor must consult with Jacobs before reporting HSE incidents to government authorities or other third parties.

Subcontractors are responsible for maintaining a First Aid Register and where applicable maintaining an incident register (e.g. OSHA log) for all Near miss, injury, property damage and environmental events on the project.

Subcontractors must immediately inform the Contractor Site/Project Management of any regulatory agencies' inspections or other actions involving the Subcontractors work.

Investigations

Subcontractors must fully cooperate with any investigation as directed by Jacobs. Jacobs will determine whether the investigation is led by Jacobs or the Subcontractor.

Securing the incident scene is essential to ensure an effective incident investigation. No materials or equipment shall be moved until a review of the incident is complete, except when not securing equipment or materials that could result in further injury.

Obtain witnesses' names, permanent addresses, and signed statements of their complete factual observations

All incident investigations must be documented using an Investigation Report accepted by Jacobs. Initial Investigation reports for all Subcontractor work-related incidents shall be forwarded to Jacobs Site/Project Management and Site HSE Representative within twenty-four hours of the occurrence.

DRUGS, ALCOHOL, AND CONTRABAND

Jacobs strictly prohibits the use, sale, attempted sale, manufacture, possession, distribution, cultivation, transfer, or dispensing of any illicit substance. This includes the use or possession of prescription medications without a valid prescription.

Subcontractor shall have and enforce compliance with a Drug, Alcohol, and Contraband Policy, including post incident testing, where permissible under National, State or local regulations.

When requested by Jacobs, the Subcontractor must present written verification of a negative drug/alcohol screen for each person (performed within 30 days of coming onsite), prior to the person being allowed on the project.

Subcontractor will forward all results to Jacobs from post-incident testing of any person involved in a project-related workplace incident. Post-incident testing must be conducted as soon as possible after the incident occurs.

Reasonable suspicion testing may be required upon reasonable suspicion by Jacobs or Subcontractor management that a person is under the influence of a prohibited substance. In such

cases, person(s) shall be immediately removed from the project and surrender their project credentials. Personnel so removed may only be allowed to return with a negative test result and written permission of Jacobs.

Periodic random or unannounced testing for personnel randomly selected or chosen by job classification or worksite may be required, based on contract. The percentage of the workforce, or the number of persons selected for testing shall be specified on a project specific basis and stated in the PHSEP.

Any person whose drug or alcohol test is positive will be removed from the project and required to surrender their project credentials.

Refusal to submit to drug or alcohol testing, or attempts to tamper with, adulterate, dilute, or otherwise tamper with a test sample will be treated the same as a positive test result.

Subcontractor shall adopt collection, chain-of-custody, and other related procedures consistent with sound industry practice.

The owner's or Client's drug and alcohol testing requirements may be more stringent than Jacobs minimums. In such instances, the most stringent requirements shall be enforced.

If Jacobs or Owner suspects that an individual is in possession of illegal drugs, alcohol, or contraband, Jacobs may request the individual to submit to a search of their person, personal effects, vehicles, lockers, and baggage. Jacobs may also conduct random searches of individuals entering or leaving the work site. Any suspected contraband will be confiscated and may be turned over to law enforcement, as appropriate. If an individual is asked to submit to a search and refuses, that individual will be considered insubordinate, will surrender their project credentials, will be escorted off the job, and will not be allowed to return.

Jacobs shall have the right to review the Subcontractor's Drug, Alcohol, and Contraband Policy and to audit the Subcontractor's implementation of its program at the jobsite.

Subcontractors shall comply with all applicable National, State, and Local alcohol and drug-related laws and regulations.

PERSONAL CONDUCT

Horseplay, fighting, bullying, gambling, possession of firearms, theft, vandalism, sabotage and distribution of unauthorized literature shall be cause to bar those involved from the site.

REWARDS AND RECOGNITION

Subcontractor and Lower Tier Subcontractors will support a rewards and recognition program; for their scope of work. Resources shall be made available for the reward and recognition of Subcontractor and Lower Tier Subcontractor personnel

HSE ACCOUNTABILITY

Subcontractors are required to comply with the applicable HSE requirements and regulations, and project HSE plans. Failure to comply with safe work practices can result in restriction or removal of the Subcontractor staff from the job site, termination of the subcontract, restriction from future work, or all three.

Only written approval from Jacobs can reinstate a Subcontractor's eligibility.

END ATTACHMENT G

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4008 Legendary Drive, Suite 600, Destin, FL 32541
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Attachment H

JACOBS-TITAN
MOLD PREVENTION
PROGRAM
for
OKALOOSA COUNTY SCHOOLS PROGRAM

Jacobs/Titan – A Joint Venture
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1.0 INTRODUCTION

To reduce the potential for mold-related claims, TPM has developed this Mold Prevention Program. This program was developed to-

- Guide engineers, designers and architects in designing buildings to reduce the potential for mold growth,
- Direct project management and construction personnel in controlling mold issues during the construction phase of the project, and
- Assist building managers in controlling mold issues in occupied buildings.

2.0 PREVENTION & REMEDIATION

2.1 Mold Prevention

The best defense against mold infestation is systematic prevention, involving both a quality and durable building design and construction methods that protect the building components until the envelope is complete.

New Construction

Project personnel will take precautions to control the factors, such as water intrusion and humidity levels that produce mold on materials, equipment, and in the facility or building during construction. The project management team is to establish a Project Mold Protocol that includes, but is not limited to, the following items:

- Inspection of all building materials delivered to the project for pre-existing water damage as well as existing mold growth.
- Measures to reduce the possibility of water intrusion in the building. Project management will also ensure that contractors immediately address any water contamination on installed and in-place equipment and construction materials, such as HVAC, ducts, drywall, cabinetry, and ceiling tile.
- Measures to control the building's humidity levels during construction and ensuring that the building's HVAC system is operable as soon as possible. The HVAC system must be maintained frequently to reduce the possibility of duct contamination during the construction.
- A requirement for immediate notification of the Project Manager if in-place construction materials become wet. The Project Manager, with assistance from the TPM HSE Department, TPM Mold Task Force, or a company-approved independent mold consultant, will determine whether or not the building materials must be removed and replaced.
- If moisture damaged work is subcontracted or is the subject of a purchase order, the contractor's Project Manager shall immediately provide verbal and written notice to the responsible subcontractor or vendor. The notice should indicate that the subcontractor's insurance company be notified of a potential claim.
- Under no circumstance may new or additional construction materials be placed over, or otherwise enclose, wet or potentially moldy construction materials.

- If lack of ventilation or moisture build-up is discovered during construction, steps must be taken to ventilate the area promptly. If the moisture issue cannot be resolved, the responsible TPM regional operations and HSE managers are to be notified.

Details of Construction Phase mold prevention activities are listed on the Mold Prevention Checklist (see Attachment 1).

Demolition, Renovation, or Addition/Expansion Projects

Before initiating work at an existing facility or building, the Project Manager shall discuss and educate the client/owner on the benefits of having a mold survey completed. The completion of this survey is the responsibility of the client/owner, who can contract an independent consultant to determine if mold is a current or potential hazard on the project.

When demolition, renovation, or addition/expansion of existing structures will be performed, proven techniques will be implemented so that mold is not spread throughout the existing facility or building. During the actual renovation work, mold protection practices such as those shown in New Construction Projects, 3.12 above, shall be implemented.

3.0 SPECIFICATIONS

3.1 Contractual Language

Materials

Contractor shall be responsible for all materials delivered and Work performed by it or any of its subcontractors or suppliers until final completion and acceptance by TPM and shall ensure that all materials are free from asbestos, mold/fungus or other toxic or contaminated substances. Contractor hereby assumes the risk of loss or damage to all materials and equipment furnished by, to, or on behalf of Contractor until final completion and acceptance by TPM and shall be solely and exclusively liable to TPM and Owner for any loss, damage or expenses associated with the presence or removal of asbestos, mold/fungus or other toxic or contaminated substances. Contractor shall advise TPM in advance of all major shipments of equipment or material and shall coordinate arrival and unloading with TPM. Contractor shall be responsible for unloading and storing materials shipped to the Project site. All shipments shall be consigned to Contractor with freight fully prepaid. Contractor shall notify TPM 5 days in advance of any shipment.

Contractor warrants that all equipment and materials furnished or installed by Contractor will be new and free from defects (latent or otherwise) in material, workmanship, installation, or design furnished, and fit for the purpose intended, and free from asbestos, mold/fungus or other toxic or contaminated substances and that the Work will be free from defects and fit for the purpose intended, and that the Work will conform with the requirements of the Subcontract Documents, for a period of no less than 12 months following final acceptance by TPM and Owner or such longer period as may be prescribed in the Subcontract Documents. Contractor agrees, at its own cost, to repair or replace any equipment, material, workmanship, or design furnished which shall have proved defective within the warranty period and to be responsible and hold TPM harmless for any and all damages caused by such defective Work and well as for any loss, damage or expenses associated with the presence or removal of asbestos, mold/fungus or other toxic or contaminated substances.

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This warranty shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Subcontract Documents. Work not conforming to the requirements of the Subcontract Documents, including substitutions not properly approved and authorized, may be considered defective.

3.2 Contractor Obligations

Contractor's Obligation to Sequence, Coordinate, Protect Work
The Contractor's obligation hereunder to sequence and coordinate its work with the work of its subcontractors and other contractors includes sequencing and coordinating its work to protect the work of other contractors and the project's interior from weather damage and water intrusion. The Contractor's obligation to protect the work under this Agreement includes protecting its own work and materials, as well as the work and materials of its subcontractors and other contractors, and the project's interior from weather damage and water intrusion.

Responsibility for Water Intrusion
In the event of water intrusion occurs weather or any other cause due to the Contractor's failure to carry out its obligations, the Contractor shall be responsible for the cost to remedy all damages caused thereby, including but not limited to testing and remediation of mold and toxic substances before and after remediation costs.

Moisture Control Rider.
Contractor acknowledges and agrees to adhere to the requirements of the Mold Protocol attached to this Agreement and incorporated by reference herein.

Agreement to Indemnify
The Contractor agrees to defend, indemnify and hold harmless Owner and TPM from and against all claims, demands, liabilities, losses, damages, fines, penalties, attorney's fees, interest, costs, and expenses of any kind or nature, relating to or arising out of water intrusion.

3.3 Contractor Moisture Control

TPM policy is for the control of water infiltration and moisture build-up during the course of a Project. By signing a Contract with TPM, Contractor expressly acknowledges and agrees that the TPM guidelines and protocol for water and moisture control are incorporated by reference into the Contract. Contractor's contractual obligations include, but are not limited, to the following:

Water Infiltration
Any employee who observes water infiltration (unintended) into a completed building or any ongoing construction site must immediately report the condition to the TPM Project Manager.

The Contractor shall immediately take steps to investigate the source of the water infiltration, identify the responsible party (person who performed work that resulted in water infiltration and devise a procedure to promptly eliminate water infiltration into the building.

Handling Of Water-Damaged Building Materials and Construction
Closely inspect all building materials delivered to the site for pre-existing water damage and existing mold growth.

If in-place construction becomes wet, notify the TPM Project Manager immediately. The Project Manager will determine whether or not the work must be removed and replaced, or if the type of material can be permitted to dry.

- If the damaged work is sub-subcontracted or the subject of a purchase order, the Contractor shall immediately provide written notice to the responsible sub-contractor or vendor, together with the demand that their insurance carrier be notified of a potential claim. Similar notice must be immediately given to any other subcontractor responsible for the work, which permitted the moisture to infiltrate the project and damage the material.
- Under no circumstances may new or additional construction be placed over, or otherwise enclose, wet building materials

Visible Mold/Mildew

Any employee who observes any substance that appears to be mold or other fungal growth and/or an unidentified substance within a completed building or an ongoing construction site shall immediately suspend construction operations in the area and report the condition to the TPM Project Manager.

No one shall be allowed back into the affected area without the permission of the TPM Project Manager.

Enclosed Spaces

The Contractor shall review all plans and specifications in an effort to determine whether the building design creates any tightly enclosed spaces or other conditions that could create water or humidity problems on the Project. Particular attention must be paid to the movement of air within the enclosure, including the use or lack of ventilation.

If such a condition is discovered, it shall be brought to the attention of the TPM Project Manager.

If a lack of ventilation or moisture build-up is discovered during construction, then the Contractor must take steps to ventilate the area and immediately bring this issue to the attention of the TPM Project Manager.

If the matter is not resolved to the Project Manager's satisfaction or water/humidity problems arise/persist in the area, then the Contractor shall promptly take such other steps as the Project Manager may direct.

4.0 Attachments

Mold Prevention Checklist

A checklist has been developed for employees to review to ensure that they have addressed the potential for mold during the Design, Construction, and Close-Out phases of a project. See Figure 1.

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Mold Prevention Checklist

(Attachment 1)

Construction Planning

- ❑ Provide temporary protection plan for building elements and stored materials.
- ❑ Locate a weather-protected, humidity-controlled storage area for material susceptible to water damage and mold growth.
- ❑ Where possible, schedule porous building materials to be delivered and installed in dry season.
- ❑ Develop plan to protect stucco or other exterior insulation and finish system (EIFS) during installation from rain or excess humidity.
- ❑ Review all construction activities that introduce water into the sealed building envelope, such as plumbing flushes, sprinkler testing, and final cleaning, and develop water collection areas and mitigation strategies for mold prevention.
- ❑ Develop renovation work plan to prevent Indoor Air Quality problems that could result in transmitting dust, odors, microorganisms and their spores, and VOC's. Include scheduling work during periods of low occupancy, pressurizing spaces that adjoin area of work, providing temporary barriers, and blocking return air vents in renovation work areas.
- ❑ Ensure that the building owners do have mold inspection and identification testing done prior to demolition/renovation beginning to identify and premeditate existing conditions.
- ❑ Use mock-ups to identify possible water intrusion issues for the building/structure construction.

Construction Phase

Received Materials

- ❑ Inspect shipping container and material/equipment for damp/wet or moldy conditions.
- ❑ If shipping container is damp, wet, or has mold growth, **remove and discard.**
- ❑ Reject deliveries of water-damaged materials.
- ❑ Require certification at time of delivery that materials are received in good, dry condition.
- ❑ If product is damp or wet with **no** mold growth, notify supplier and determine if it can be dried and properly protect protected.

Stored Materials

- ❑ Inspect stored materials regularly for signs of water infiltration or mold growth.
- ❑ Store materials/equipment in a weather/water protected area. Elevate stored materials off floors, using pallets or cribbing to prevent accidental water exposure and to ensure air movement under and around materials.
- ❑ Cover staged materials to prevent weather/water damage.
- ❑ DO NOT install moldy or wet materials. Materials must be dry and free of water staining or mold growth, especially before enclosure in areas where they will be isolated from air movement, such as inside walls.

Construction Sequencing and Protection

- ❑ Establish and maintain the building envelope, including proper design and installation of doors, doorjambs, windows, flashings, caulking, waterproofing membranes, and roofing systems.
- ❑ Consider using dehumidifiers and/or air dryers to condition the air in the construction zone.
- ❑ Do not operate gas-powered machinery inside the enclosed building. These cause elevated humidity levels.
- ❑ Do not operate the HVAC system until it has been completed and inspected for water damage or mold growth.
- ❑ Consider using fans and air dryers during painting and concrete curing.
- ❑ Clean-up water infiltration/puddling immediately.
- ❑ Ensure proper over-lapping at architectural reveals, joints, and corners.
- ❑ Ensure proper installation and protection of stucco or other EIFS products to avoid moisture's being captured on exterior wall substrates.
- ❑ Develop comprehensive temporary protection plan that will protect roof and building envelope during course of construction.

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- ❑ Develop critical path of installation of building envelope materials to minimize exposure of interior of building to elements.
- ❑ Contractor shall perform periodic inspections of site and building envelope to ensure that no water enters building envelope.
- ❑ Avoid use of portable humidifiers or gas-fired or oil-fired heaters or lighting.

Installed Materials Damaged By Water

- ❑ Sources of water intrusion or excessive moisture build-up must be mitigated immediately.
- ❑ Drywall or Plaster: Remove and replace all water-damaged drywall and insulation within 24 hours. If longer than 24 hours, or mold has already begun to grow, contact a professional remediation firm.
- ❑ Ceiling Tiles: Remove and dispose of wet ceiling tiles within 24-48 hours of water damage.
- ❑ Hard Surfaces, Concrete, CMU: Scrub water damaged surfaces with a mild detergent followed by a rinse using a solution of ¼ to ½ cup bleach per gallon of water. DO NOT follow with a clear water rinse, as it is desirable for the bleach to remain. Dry thoroughly. *CAUTION: Use bleach in a well-ventilated area and do not mix bleach with ammonia or other cleaning fluids, as hazardous vapors will occur.*
- ❑ Metal Surfaces: Scrub surfaces with a mild detergent. Dry thoroughly. Do not use a bleach rinse as bleach may cause corrosion on metal surfaces.
- ❑ Carpet and Upholstered Furniture: Carpet and upholstered furniture damaged by steam leaks or potable water should be cleaned, dried and monitored for mold growth or odors. Wet carpet and padding is to be pulled up and dried quickly, if not removed. Carpet and upholstered furniture damaged by floods, sewage, groundwater, or roof leaks should be disposed of immediately.
- ❑ Hardwood and Laminate Furniture: If laminate is intact, hardwood and laminate furniture should be cleaned with a solution of ¼ to ½ cup of bleach per one gallon of water, and air-dried. *CAUTION: Bleach may damage or fade colors, therefore test the bleach solution in an inconspicuous area before proceeding.* If laminate has delaminated, dispose of furniture.
- ❑ Pressed-wafer board or Particleboard: Dispose of material.
- ❑ Files and Papers: Dispose of non-essential wet files and paperwork. The exception would be papers damaged by steam leaks or potable water; these can be dried and monitored for mold growth or odors. Essential wet papers should be removed to a location where they can be dried and photocopied, then discarded. If files or paper cannot be evaluated within 24-48 hours of water damage, files and paperwork may be rinsed with clean water and temporarily frozen until proper drying and evaluation can be completed.
- ❑ Photograph water-damaged materials and document proper disposal or cleaning.
- ❑ Water-damaged building insulation, including rigid and batting, shall be removed and discarded.

Close-Out Phase

Final Inspection

- ❑ Complete *Integrated Building Commissioning procedure.*
- ❑ Inspect all visible surfaces for water staining, mold growth, and odors prior to turnover to owner. Document the results of the inspection. Consider using a Certified Industrial Hygienist, specially trained in mold detection, for this inspection.
- ❑ Replace all air filters throughout system following balancing and prior to owner turnover and occupancy.
- ❑ Perform complete air balancing for HVAC and provide documentation to owner or owner's representative.
- ❑ Inspect all air handling unit drainage pans to verify that they are clean and draining properly.

Turnover & Owner Operation

- ❑ Recommend that client/owner of the building schedule operating and maintenance training for their building maintenance personnel. Offer to help in the future if the client/owner declines.
- ❑ Educate the owner on the hazards of molds and fungus, the steps TPM has taken to avoid water damage and mold development, and the responsibilities of the owner's maintenance staff to monitor and prevent water infiltration and mold growth.
- ❑ Instruct owner to operate the building so that the indoor air pressure is slightly positive relative to the outdoor air pressure.
- ❑ Recommend that owner operate the HVAC at 30 to 60% relative humidity.

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- ❑ Recommend that owner schedule regular, periodic inspections of all enclosed areas that have the potential for accumulation of moisture and that they should repair leaks and/or seepage immediately when discovered.
- ❑ Recommend that owner have regular cleaning and maintenance performed on internal HVAC components, and regularly replace all air filters.
- ❑ Recommend that owner avoid cooling the interior space below the mean monthly outdoor dew point temperature.
- ❑ Recommend that owner not allow occupants of the building to use personal humidifiers or dehumidifiers to adjust individual comfort levels.
- ❑ Obtain signoff by owner's representative to the effect that they have received the turnover training and recommendations and that the building is mold free.

Attachment I

PARTIAL RELEASE OF LIEN AND AFFIDAVIT

STATE OF FLORIDA)
COUNTY OF_____)

Before me, the undersigned authority, personally appeared _____, who after being duly sworn, deposes and says:

(1) In accordance with the Contract Documents and in consideration of $_____ after it has been received, ("Contractor") releases and waives for itself and its subcontractors, materialmen, successors and assigns, all claims, demands, damages, costs and expenses, for the value of labor, materials, equipment and supplies, against Jacobs/Titan Technologies, A Joint Venture ("TPM") and The School Board of Okaloosa County ("Owner") relating in any way to the performance of the Contract For Construction Services, dated _____, 2024, for the period from _____ to _____.

(2) Contractor certifies for itself and its subcontractors, materialmen, successors and assigns, that all charges for labor, materials, supplies, lands, licenses and other expenses for which TPM or Owner might be sued or for which a lien or a demand against any payment bond might be filed, have been fully satisfied and paid.

(3) Contractor agrees to indemnify, defend and save harmless TPM and Owner from all demands or suits, actions, claims of liens or other charges filed or asserted against TPM or Owner for the value of labor, materials, equipment and supplies arising out of the performance by Contractor of the Work covered by this Release and Affidavit.

(4) Contractor certifies that it has paid all its subcontractors and materialmen in full all amounts owed them from any previous payments received by Contractor from TPM and has not withheld any such amounts. In the event Contractor withholds any unpaid amounts due its subcontractors and/or materialmen from the payment it receives from TPM with respect to the Application for Payment referenced in paragraph 5 below, Contractor agrees to immediately refund all such unpaid amounts to TPM.

(5) This Release and Affidavit is given in connection with Contractor's Application for Payment No._____.

CONTRACTOR:

_____
(*Company Name*)

By: _____
President

_____
_____
Witnesses

Date: _____

[*Corporate Seal*]

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me this _____ day of _____ , 2024, by _____, as _____ of _____, a _____ corporation, on behalf of the corporation. He/She is personally known to me or has produced a _____ (*state*) driver's license no._____ as identification.

My Commission Expires:

_____
Notary Public (*Signature*)

(AFFIX NOTARY SEAL)

_____
(*Printed Name*)

_____
(*Title or Rank*)

_____
(*Serial Number, if any*)

Attachment J

FINAL RELEASE OF LIEN AND AFFIDAVIT

STATE OF FLORIDA)
COUNTY OF_____)

Before me, the undersigned authority, personally appeared_____, who after being duly sworn, deposes and says:

(1) In accordance with the Contract Documents and in consideration of $_____after it has been received, ("Contractor") releases and waives for itself and its subcontractors, materialmen, successors and assigns, all claims, demands, damages, costs and expenses, whether in contract or in tort, against Jacobs/Titan Technologies, A Joint Venture ("TPM") and The School Board of Okaloosa County ("Owner") relating in any way to the performance of the Contract For Construction Services, dated _____, 2024, subject to paragraph 6 below.

(2) Contractor certifies for itself and its subcontractors, materialmen, successors and assigns, that all charges for labor, materials, supplies, lands, licenses and other expenses for which TPM or Owner might be sued or for which a lien or a demand against any payment bond might be filed, have been fully satisfied and paid.

(3) Contractor agrees to indemnify, defend and save harmless TPM and Owner from all demands or suits, actions, claims of liens or other charges filed or asserted against TPM or Owner arising out of the performance by Contractor of the Work covered by this Final Release and Affidavit.

(4) Contractor certifies that it has paid all its subcontractors and materialmen in full all amounts owed them from any previous payments received by Contractor from TPM and has not withheld any such amounts. In the event Contractor withholds any unpaid amounts due its subcontractors and/or materialmen from the payment it receives from TPM with respect to the Application for Payment referenced in paragraph 5 below, Contractor agrees to immediately refund all such unpaid amounts to Contractor.

(5) This Final Release and Affidavit is given in connection with Contractor's Final Application for Payment No._____

(6) _____Those claims of Contractor against TPM which have been identified in writing, remain unsettled and which are exceptions to the foregoing release are listed in Appendix 1 attached hereto, or

_____There are no claims of Contractor against TPM which remain unsettled.

CONTRACTOR:

_____
(*Company Name*)

By: _____
Its: President

_____
Witnesses

Date: _____

[*Corporate Seal*]

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me this_____ day of_____, 2024, by_____, as_____of_____, a_____corporation, on behalf of the corporation. He/She is personally known to me or has produced a_____(*state*) driver's license no. _____as identification. My Commission Expires:

Notary Public (*Signature*)

(AFFIX NOTARY SEAL)

_____
(*Printed Name*)

_____
(*Title or Rank*)

_____
(*Serial Number, if any*)

Jacobs/Titan – A Joint Venture
School District of Okaloosa County Program Office
4008 Legendary Drive, Suite 600, Destin, FL 32541
850.897.8125 Fax: 850.897.0123

ATTACHMENT K
SUPPLEMENTAL CONDITIONS

These Supplemental Conditions include general requirements and miscellaneous items of Work to be performed by the Contractor. The cost of such Work shall be the responsibility of the Contractor unless otherwise specifically stated to the contrary in Attachment A – Scope of Work.

ARTICLE 1
WORKER IDENTIFICATION SYSTEM

1.1 All Contractor employees, of any tier, shall be required to have the name of the company they are employed by and the employees name on the front of their hard hats prior to work in the field. In addition, passes and/or badges may be required on this project. The Contractor shall provide, in writing, and maintain in current status, a list of all personnel on the Project and the company principal to whom the Contractor's representative reports. The list shall include names, titles and business and emergency telephone numbers.

1.2 Three (3) duly authorized representatives of the Contractor shall be available on call for emergency telephone communication from the TPM on a 24-hour basis, seven (7) days a week, commencing with the effective date of the Notice to Proceed through final completion of the Contractor's work.

1.3 Proper identification badges must be displayed by all persons to gain access to the site. Contractor and its major subcontractors shall obtain at their own cost identification badges (blue) with escort privileges for their field supervisors (foremen and above) and such additional employees as desired by Contractor which allow them to access the Project site without being escorted. Additionally, Contractor and its subcontractors shall obtain at their own cost identification badges (maroon) for all other employees and workers accessing the Project site who must be escorted by personnel with blue badges. Such badges shall be worn clearly visible on outer work garments at all times when on site. All personnel issued identification badges must successfully complete the Contractor's basic project orientation. It shall be the Contractor’s responsibility to ascertain the cost and application process for badges as well as fees for lost or stolen badges which shall be included in the Contract Price.

1.4 No employee or representative of the Contractor and its subcontractors of any tier shall be admitted to the site of the Work unless they are a citizen of the United States, or, if not a US citizen, documentation verifying that employment within the United States is legal.

ARTICLE 2
LABOR RELATIONS AND COOPERATION OF CONTRACTORS

2.1 Cooperation - Inasmuch as the completion of the Work within the prescribed time is dependent upon the close and active cooperation of all those engaged herein, it is, therefore, expressly understood and agreed that Contractor shall lay out and install its Work at such time or times and in such manner as consistent with the most current schedule and the TPM's directions in the carrying forward of the Work.

2.2 Harmony - Contractor is advised, and hereby agrees, that he will exert every effort to assure that all labor employed by Contractor and its subcontractors for Work on the Project shall work in harmony with and be compatible with all other labor being used by other building and construction contractors and subcontractors on the site of the Project. Contractor further agrees that this provision shall be included in all Sub-Subcontracts of the Contractor; provided, however, that this provision shall not be interpreted or enforced so as to deny or abridge, on account of membership or non-membership in any labor union or labor organization, the right of any person to work as guaranteed by Article 1, Section 6, of the Florida Constitution.

2.3 The Contractor shall cooperate with and afford the TPM, Owner, and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate its Work with theirs as required by the Contract Documents. The Contractor shall not endanger any work of any separate contractors by cutting, excavating, or

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otherwise altering their work, and shall not cut or alter their work without the written approval of the TPM.

ARTICLE 3
PRESS RELEASE & CONFIDENTIAL INFORMATION

3.1 The Contractor agrees that no press releases, articles for professional journals, speeches, or other kinds of publicity concerning the project shall be released, made, or generated by the Contractor or its employees or agents without the prior written consent of the Owner through the TPM.

3.2 The term "Confidential Information" means all unpublished information obtained or received from the Owner or TPM during the term of this Contract which relates to the Owner's or TPM's business affairs. The Contractor shall not disclose confidential information to any person, except to its employees and subcontractors to the extent that they require it in the performance of their work, during the term of this Contract and until authorized by the Owner and TPM in writing. The Contractor and its subcontractors shall hold all confidential information in trust and confidence for the Owner and TPM, and shall use confidential information only for the purpose of this Contract. The Contractor and its subcontractors shall require all of their employees to whom confidential information is revealed to comply with these provisions. The Contractor shall have an agreement with each subcontractor and supplier requiring their compliance with the foregoing.

ARTICLE 4
CONTROL OF PROJECT SITE

4.1 The TPM shall have control, custody, dominion and possession of the land on which the Project is being constructed for the purpose of building the facility, storing materials and removing any unauthorized person or persons or trespasser or trespassers and the right and authority to carry out such purposes. The TPM shall have the express authority to post signs restricting access to the property or specific areas of the property and to remove, bar and prosecute trespassers and to undertake legal and equitable actions against trespassers. The TPM reserves the right to invoke any security means it deems appropriate to protect the property and the building under construction.

ARTICLE 5
BLOCKING, BACKING, GROUNDS, SLEEVING AND ACCESS OPENINGS

5.1 Contractor shall be responsible for laying out and providing any and all blockouts, cutouts, corings, blocking, backing, grounds, sleeving, supports, shims, anchoring devices, sealants and access openings with covers as required for the proper installation of its materials and equipment and the execution of its Work in accordance with the intent of the Contract Documents and applicable codes whether or not specifically shown or indicated on the Plans and Specifications. Contractor shall be further responsible for repairing, sealing, and/or finishing, in an acceptable fashion to meet all applicable code requirements, any such blockout, cutout, coring or other hole in any floor, ceiling or wall, any security or fire-rated barrier or any finished surface. Contractor shall not cut, weld to, core, chip or otherwise alter any structural work without the written consent of the Architect/Engineer through the TPM. Coring of post tensioned slabs and beams will not be allowed. All closures and sealants between sleeving cut outs, corings and/or blockouts and the penetrating piping, duct, etc. shall be provided by the Contractor.

ARTICLE 6
PROTECTION OF EXISTING FACILITIES AND PROPERTY

6.1 Contractor shall provide and maintain proper shoring, sheeting, bridging and/or bracing for existing underground utilities, sewers, building foundations and other structures encountered during its excavation work, whether shown or not shown on the plans and specifications, to protect them from collapse or other type of damage until such time as they are to be removed, incorporated into the Work, or can be properly backfilled upon completion of the Work. Contractor shall contact local underground utility locating services prior to excavation. Contractor shall provide and maintain properly designed shoring, sheeting. bridging and/or bracing in accordance with OSHA standards and the

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Florida Trench Safety Act to prevent earth from caving in or washing into trenches or excavations which are a part of Contractor's Work.

6.2 Contractor shall maintain and replace all existing or new barricades damaged or replaced during their operations.

6.3 Contractor shall be responsible for the necessary cleaning, dust control and repairing of adjacent drives and streets resulting from Contractor's operations. Cleaning shall occur immediately on a daily basis.

6.4 Contractor shall ascertain any restrictive traffic conditions and shall comply with requests of local authorities and the Owner and TPM in the use and operation of its trucks and equipment on the site and public roads. The Contractor shall protect existing curbs, walks, overhead utilities, underground utilities or other improvements from damage by heavy equipment. Contractor shall be responsible for the necessary cleaning and repairing or replacing of damaged curbs, sidewalks, entrance driveways, ramps, corridors, overhead or underground utilities, etc. resulting from Contractor's operations excluding work specifically indicated to be removed or demolished elsewhere in the Contract Documents.

6.5 Should Contractor excavate across an access road, walkway, or parking area. Contractor shall backfill and compact its excavation and resurface the road or parking area to match the existing surface. The Contractor shall comply with all applicable Specifications when so doing. Unless otherwise specified, all pavements, walks, curbs, etc. shall be saw cut and resurfaced to match existing thicknesses and colors.

6.6 Contractor shall not disturb or alter any existing trees, shrubs or other landscaping without the express written consent of the Owner through the TPM.

ARTICLE 7
ALLOWANCES

7.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by these allowances shall be provided for such amounts and by such persons as the TPM may direct.

7.2 Unless otherwise provided in the Contract Documents:

7.2.1 These allowances shall cover the cost to the Contractor, less any applicable trade discount, of the materials and equipment required by the allowance delivered at the site, installation labor, and all applicable taxes;

7.2.2 The Contractor costs for unloading and handling on the site, supervision, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the Contract Sum and not in the allowance;

7.2.3 Should the actual work selected be of greater or lesser value than the stated amount, the contract sum shall be adjusted accordingly. Allowances may be eliminated by deductive change order for full value at no additional cost to the TPM. Additional fee for increases shall be as allowed in the Contract.

ARTICLE 8
EXAMINATION OF BASE SURFACES

8.1 Contractor shall examine the existing base surfaces and conditions upon which its materials are to be installed and verify all in-place conditions and dimensions in the field and notify the TPM in writing in advance, if conditions are detrimental to the proper installation of the Work. Do not apply work over other contractor's uncompleted work. Commencement of installation constitutes acceptance of base surfaces and the responsibility and cost of any corrective work due to such faulty base surfaces.

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ARTICLE 9
WORKING HOURS

9.1 Normal working hours for the Project shall be 7:00 a.m. to 5:00 p.m., Monday through Saturday or as otherwise adjusted by TPM. Contractor shall fully man the Project to provide at least eight actual hours of work (not including lunch breaks) on Monday through Friday during such normal working hours. The TPM reserves the right to stagger the starting and ending times (within the Project normal working hours) in order to facilitate site access. If directed by the TPM, Contractor shall perform all utility and service connections to existing services and other critical or sensitive work at other than normal working hours in order to cooperate with Owner's operations. The TPM's decisions in the scheduling of off-hour work shall be final. Contractor shall work such additional or overtime hours at its own expense as may be required by the TPM or necessary to maintain the Project Construction Schedule.

9.2 Contractor shall provide proper full-time supervision during all normal working hours and whenever work under its Contract is in progress.

9.3 All temporary facilities, services, or equipment indicated to be provided by Contractor in the Contract Documents shall be provided and maintained during all normal working hours for the project.

9.4 Contractor shall be responsible for all its costs associated with such working hours.

9.5 Whenever Contractor is involved in any work creating an interruption or blockage of any service roads or access routes or otherwise restricting site access or whenever so directed by the TPM, Contractor shall perform such work on an accelerated basis utilizing all available daylight hours including weekends in order to minimize the disruption to the site or to normal construction activities or to the Owner's facility operations.

9.6 Whenever Contractor is engaged in work involving the interruption or disruption of active services or utilities, Contractor shall perform such work on a continuous twenty four 24-hour basis until the particular portion causing the interruption or disruption is completed or corrected.

9.7 All additional costs resulting from any overtime or accelerated work required by the Contract Documents, including but not limited to all premium time, additional supervision, or other overhead or general expenses shall be included in the Contract Price and shall not entitle the Contractor to any additional compensation.

ARTICLE 10
COMMUNICATIONS

10.1 Except as may be expressly provided elsewhere in the Contract Documents, there shall be no direct communication of any kind between the Contractor and the Architect/Engineer, or between Contractor and Owner without the specific authorization of the TPM. All communication by the Contractor to the Architect/Engineer or to the Owner shall be through the TPM. Where Architect's specifications state, "Notify Architect, Submit to Architect," or similar language, such notification or submittal shall be given to the TPM. Where Architect's specifications refer to "Contractor" or "General Contractor," such reference shall be understood to mean the Contractor unless specifically noted otherwise.

ARTICLE 11
PHOTOGRAPHS

11.1 Contractor shall provide access to Owner, Architect and TPM at all times for the taking of progress photographs or other photographs related to the work. No other photographs of the project shall be permitted unless specific written permission is given by the TPM. The only exception to this requirement is for normal documentation of construction progress provided however that no student, teacher or member of the public shall be photographed by Contractor. Contractor photographs are not to be used for advertising or other commercial purposes without the written consent of Owner and TPM.

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ARTICLE 12
GIFT POLICY

12.1 In keeping with treating equally all persons and firms doing or seeking to do business with or for TPM, whether as consultants, contractors, subcontractors, or suppliers, such persons and firms are respectfully reminded that TPM's employees and their families may not personally benefit from TPM's business relationships by the acceptance of gifts or gratuities. Gifts and gratuities include but are not limited to providing free of charge (or at discounts not otherwise available to the general public) entertainment, meals, drinks, transportation, memberships, presents, payments, favors, loans, or other business courtesies. This policy applies regardless of whether the gifts and gratuities are provided for a firm or anyone employed or affiliated with that firm. The only exceptions to this policy are specifically Project related events sponsored jointly by TPM and Contractor such as Project training sessions, awards & recognition ceremonies, milestone achievements, etc. In addition, it is expected that the Contractor's officers, employees and agents shall conduct all business related to this Contract within the highest ethical standards. By executing the Contract, Contractor acknowledges the contents of this Article.

12.2 Contractor warrants that it has complied with the Article 12.10 and has not offered or given and will not offer or give to any employee, agent, or representative of TPM any gift or gratuity within the meaning of this Article. Any breach of this warranty shall be a material breach of each and every Contract between TPM and Contractor.

ARTICLE 13
OWNER/TPM FURNISHED EQUIPMENT

13.1 Whenever Owner Furnished or TPM Furnished materials or equipment are shipped to the Project site, the Contractor shall notify the TPM and shall be responsible for their acceptance, unloading, proper storage, protection, tracking and incorporation into the Work. Also refer to Attachment A Scope of Work.

13.2 Items scheduled on the Plans and Specifications or otherwise indicated in the documents to be furnished by the Owner or by the TPM and to be installed by the Contractor shall be delivered to the project site by the Owner or TPM unless otherwise indicated.

13.3 Promptly upon delivery, the Contractor, jointly with the TPM, shall inspect the materials or equipment for possible shortage or damage in transit. If shortage or damage is found, Contractor shall immediately notify TPM and shall follow the instruction on the Bill of Lading for reporting to carrier and shall submit a report for proper storage and protection of items delivered, including all expenses incidental thereto.

13.4 Unless otherwise specifically indicated in the Contract Documents, the Contractor shall receive the items, sign receipt for, complete and submit receipt and inspection report to the TPM, provide additional transportation required to point of installation, uncrate, assemble, store and protect as necessary, locate in place and install or connect ready for operation or use. Assembly shall include such projecting parts and loose fittings as are usually shipped detached.

13.5 For details of construction, the Contractor shall use Manufacturer's detail drawings to establish roughing-in dimensions and location of services. The Contractor shall be provided shop drawings and product data received by TPM related to the installation of Owner or TPM furnished items. In case of conflict, the equipment detail drawings and dimensions shall be used except where aesthetic or structural considerations make an adjustment necessary.

13.6 Owner furnished kitchen equipment will be received, uncrated, stored as necessary, placed in its permanent position and installed by Contractor. In incorporating such equipment into the Work, Contractor shall provide all appurtenances, parts, anchorage devices and equipment and shall make final connections and place the equipment into service.

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ARTICLE 14
CONFLICTS OF INTEREST

14.1 Contractor warrants that, to the best of its knowledge and belief, there are no relevant facts or circumstances which could give rise to a potential or actual personal or organizational conflict of interest by Contractor, Contractor's employees, lower-tier subcontractors/suppliers, or contingent staffing in performing Work under this Contract. A Conflict of Interest means that because of other activities or relationships with other persons or entities, a person is unable or potentially unable to render impartial assistance or advice in the performance of the Work or the person's objectivity in performing the Work is or might be otherwise impaired.

14.2 Prior to commencing any Work, the Contractor agrees to notify TPM immediately if, to the best of its knowledge and belief, a potential or actual conflict of interest exists.

14.3 Contractor agrees that if a potential or actual organizational and or personal conflict of interest is identified during performance, the Contractor will immediately make a full disclosure in writing to TPM. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consultation with TPM, to avoid or neutralize the actual or potential conflict of interest. The Contractor shall continue performance until notified by TPM of any contrary action to be taken.

14.4 In accordance with other provisions within this Contract, TPM may terminate this Contract, in whole or in part, if it deems such termination necessary to avoid an organizational or personal conflict of interest.

14.5 Contractor shall include the terms of this Article in subcontracts to its lower-tier subcontractors and suppliers awarded under this Contract.

END OF ATTACHMENT K

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SECTION 00010
INVITATION TO BID

SCHOOL BOARD of OKALOOSA COUNTY
Destin Elementary School 3/4/5 Center

General Contracting Package

Sealed bids are requested from Pre-Qualified construction firms for the **General Contracting Package** required for the construction of:

Destin Elementary School 3/4/5 Center, as described in the contract documents.

Bid Proposals will be received by Jacobs|Titan, A Joint Venture as Total Program Manager (TPM) for the School District of Okaloosa County, Florida, at 4008 Legendary Drive, Suite 600, Destin, FL 32541 until **3:00 p.m., Local Time on Thursday, December 12, 2024.** Bid proposals will then be privately opened, with only bidding contractors present, and bid results will be published immediately after award of Contract.

Bids will only be accepted from the following Pre-Qualified firms:

Whitesell-Green, Inc.
P.O. Box 2849
Pensacola, FL 32513
Phone: 850.434.5311
Fax: 850.434.5315

Speegle Construction, Inc.
210 C Government Avenue
Niceville, FL 32578
Phone: 850.729.2484
Fax: 850.729.1993

A.E. New, Jr., Inc.
460 Van Pelt Lane
Pensacola, FL 32505
Phone: 850.472.1001
Fax: 850.472.1004

Lord & Son Construction, Inc.
P.O. Box 1808
Fort Walton Beach, FL 32549
Phone: 850.863.5158
Fax: 850.862.4904

Culpepper Construction
1538 Metropolitan Boulevard
Tallahassee, FL 32308
Phone: 850.224.3146

Morette Company
2503 N. 12th Avenue
Pensacola, FL 32503
Phone: 850.432.4084

Childers Construction Co.
3472 Weems Road, Unit 1
Tallahassee, FL 32317
Phone: 850.222.2281

Greenhut Construction Company, Inc.
23 S. A Street
Pensacola, FL 32502
Phone: 850.466.5421

Wharton-Smith, Inc.
49 E. Chase Street
Pensacola, FL 32502
Phone: 850-328-4350

Bidders must be authorized to do business in the State of Florida and in Okaloosa County and must possess all required construction licenses, in accordance with applicable State and local laws, rules, and regulations.

Pre-Qualified Bidders will be provided access to the bid documents via DropBox. The DropBox link will be emailed to each pre-qualified bidder. The Contract Documents will also be available for download via Procore. A Procore invitation will be emailed to each pre-qualified bidder.

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4008 Legendary Drive, Suite 600, Destin, FL 32541
850.897.8125 Fax: 850.897.0123

A non-mandatory Pre-Bid Conference will be held on Thursday, November 21, 2024 at 10:00 a.m. at the Jacobs|Titan Office, located at 4008 Legendary Drive, Suite 600, Destin, FL 32541, all visitors will meet at the Front Office. A site walk through of the project(s) will immediately follow. All bidders, subcontractors/sub-subcontractors and vendors are invited and encouraged to attend.

The successful Bidder will be required to furnish a Performance Bond and Payment Bond, each for the amount of the Contract by a qualified surety doing business in the State of Florida; and certificates of Insurance. Each Bid Proposal must be accompanied by a Bid Bond in the amount of five percent (5%) of the bid amount.

The successful Bidder will be required to Contract directly with Jacobs|Titan, the Total Program Manager (TPM), for all services included in this solicitation on the Contract form, included in the Contract Documents.

Bidder will be required to provide a written Project Safety Program to TPM. This Project Safety Program will be equal to/or greater than the Jacobs|Titan Safety Program included in the bid documents.

Jacobs|Titan reserves the right to waive any informalities or irregularities in any Bid and to reject any or all Bid Proposals.

Bid Proposals shall remain in effect for sixty (60) days after opening of bids.

Dustin Merritt,
Deputy Program Manager/Construction Manager
Jacobs|Titan
4008 Legendary Drive, Suite 600,
Destin, FL 32541

End of Invitation to Bid

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School District of Okaloosa County Program Office
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SECTION 00100

INSTRUCTIONS TO BIDDERS

SCHOOL BOARD of OKALOOSA COUNTY
DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER

General Contracting Package

1.1 RECEIPT AND OPENING OF BIDS

A. Jacobs|Titan, A Joint Venture, as Total Program Manager for the School Board of Okaloosa County, Florida, invites sealed Bid Proposals from Pre-Qualified general contracting firms for the construction project titled:

SCHOOL BOARD of OKALOOSA COUNTY, DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER, as described in the contract documents.

B. Bids will only be accepted from the following Pre-Qualified firms:

Whitesell-Green, Inc.
P.O. Box 2849
Pensacola, FL 32513
Phone: 850.434.5311
Fax: 850.434.5315

Speegle Construction, Inc.
210 C Government Avenue
Niceville, FL 32578
Phone: 850.729.2484
Fax: 850.729.1993

A.E. New, Jr., Inc.
460 Van Pelt Lane
Pensacola, FL 32505
Phone: 850.472.1001
Fax: 850.472.1004

Lord & Son Construction, Inc.
P.O. Box 1808
Fort Walton Beach, FL 32549
Phone: 850.863.5158
Fax: 850.862.4904

Culpepper Construction
1538 Metropolitan Boulevard
Tallahassee, FL 32308
Phone: 850.224.3146

Morette Company
2503 N. 12th Avenue
Pensacola, FL 32503
Phone: 850.432.4084

Childers Construction Co.
3472 Weems Road, Unit 1
Tallahassee, FL 32317
Phone: 850.222.2281

Greenhut Construction Company, Inc.
23 S. A Street
Pensacola, FL 32502
Phone: 850.466.5421

Wharton-Smith, Inc.
49 E. Chase Street
Pensacola, FL 32502
Phone: 850-328-4350

C. Bid Proposals will be received at 4008 Legendary Drive, Suite 600, Destin, FL 32541 until 3:00 p.m., local time, on Thursday, December 12, 2024 for the School Board Of Okaloosa County, Destin Elementary School 3/4/5 Center. No Bid Proposals will be received after the date and time set forth above.

D. Bids will be privately opened by TPM with only the Bidders present; bid results to be published immediately after award of Contract.

Jacobs/Titan – A Joint Venture
School District of Okaloosa County Program Office
4008 Legendary Drive, Suite 600, Destin, FL 32541
850.897.8125 Fax: 850.897.0123

E. Bid Proposals must be sealed with bidder's name on the outside of the envelope and designated as follows:

Jacobs|Titan, Total Program Manager
School Board of Okaloosa County Program
Office 4008 Legendary Drive, Suite 600
Destin, FL 32541
Attention: Program Manager

SCHOOL BOARD of OKALOOSA COUNTY, DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER

General Contracting Package
(BIDDER NAME, ADDRESS AND PHONE NUMBER)

F. Any bid may be withdrawn by written request prior to the time scheduled above for the receipt of such Bids or authorized postponement thereof. No Bid may be withdrawn for a period of sixty (60) calendar days after opening of Bids. No telephone, telegraphic, or facsimile Bids, change in Bid or withdrawal of Bid will be received or recognized. No modifications of any Bid will be considered unless in writing, sealed and received by Jacobs|Titan prior to the time established for the receipt of such Bid. Bid security shall be in an amount sufficient for the bid as modified or resubmitted.

1.2 METHOD OF BIDDING

A. Bid Proposals shall be received for all Work shown or indicated in the Contract Documents from those construction firms on the Pre-Qualified Bidders list.

B. The Work includes the Project Manual, the Contract for Construction Services, Specifications, and related Drawings.

C. Bidders are required to bid on the entire Project, including all Alternates.

1.3 AVAILABILITY OF CONTRACT DOCUMENTS

A. Pre-Qualified Bidders will be provided access to the bid documents via Dropbox and/or email . The Drobox link will be emailed to each Pre-Qualified Bidder.

B. The Contract Documents will also be available for download via Procore. A Procore Invitation will be sent to all Pre-Qualified Bidders via email.

1.4 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Each Bidder shall be held to have examined the site of the proposed Work and shall fully acquaint themselves with the conditions and limitations as they exist, including those of labor and progress of work to date, if any, and shall also thoroughly examine the Contract Documents and compared them with existing conditions. Each Bidder will be familiar with weather conditions of the project area. Failure of any Bidder to visit the site and acquaint themselves with the Contract Documents shall in no way relieve Bidder from any obligations with respect to their bid.

B. No consideration will be granted for any alleged misunderstanding of the material, article or piece of equipment to be furnished work to be done; it being understood that the tender of a Bid Proposal carries with it the agreement to all items and conditions referred to herein or indicated in the Contract Documents.

C. A non-mandatory Pre-Bid Conference will be held on Thursday, November 21, 2024, at 10:00 a.m. at Jacobs|Titan office located at 4008 Legendary Drive, Suite 600, Destin, FL 32541. A

site walk through of the project location(s)will immediately follow. All Bidders, subcontractors/sub-subcontractors and vendors are invited and encouraged to attend.

D. Unless otherwise indicated by the TPM, additional site visits of existing School Facilities will be by appointment only, which will be made at the Pre-Bid Meeting or by contacting **Dustin Merritt** at dustin.merritt@jacobs.com.

1.5 ADDENDA AND INTERPRETATIONS

A. No interpretations of the meaning of the Drawings, Specifications, or other documents will be made to any Bidder verbally. Every request for such interpretation shall be sent via email to **Dustin Merritt (dustin.merritt@jacobs.com)**, and to be given consideration, must be received at least five (5) calendar days prior to the date fixed for the opening of Bids. Questions shall reference project, drawing and/or specification number and shall include the name of the firm, contact, telephone number and address.

B Bidders are required to notify TPM if there are any errors, ambiguity or inconsistency, which they may discover upon reviewing the Contract Documents or the site and local conditions. Any and all interpretations and any supplemental instructions will be in the form of written Addenda to the Contract Documents which, if issued, will be sent to all persons on record as having received a complete set of Contract Documents at the respective addresses furnished for such purpose. Such Addenda will be mailed or otherwise sent by courier or electronic means not later than 48 hours prior to time set for opening of bids. Failure of Bidder to receive any Addendum or interpretation shall not relieve such Bidder from any obligation under his Bid as submitted.

C All Addenda so issued shall become part of the Bidding and Contract Documents.

D. Each bidder shall acknowledge that they have received all addenda issued prior to submitting their bid.

1.6 SUBSTITUTIONS DURING BIDDING

A. Requests for changes proposed by the bidder in products, material, equipment, fixture, form, and methods of construction required by the Contract Documents, or shown by name, make, or catalog number, shall be made in writing to the TPM by the close of business on the day of the Pre-Bid Meeting. Such requests shall be accompanied by the following data supporting the claim to equality:

1. Identify the product, fabrication or installation method to be replaced. Include related Specification Section and Drawing numbers.
2. Product Data, including drawings and descriptions of products, fabrication and installation procedures.
3. Samples, where applicable or required.
4. A detailed comparison of significant quantities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
5. Coordination information, including a list of changes of modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
6. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

7. Cost information, including a proposal of a net change, if any.

8. Indicate the effect of the proposed substitution on overall Contract Time.

B. Approval by the TPM, if given, will be made by addendum issued through the TPM. Said approval will indicate that the additional article, device, product, material, fixture, form or type of construction is approved for use insofar as the requirements of this project are concerned.

C. No substitutions are allowed under the base bid unless approved by addendum.

D. If approved, all modifications necessary as a result of the use of an approved substitute shall be paid by the bidder proposing the substitution.

E. TPM's decision as to acceptance or non-acceptance of a substitution shall be final. Under no circumstances will the TPM be required to prove that a product proposed for substitution is or is not of equal quality to the product specified.

1.7 ALTERNATES

A. The bidder must bid on all Alternates contained in the Bid Documents. The bidder shall list a value for each Alternate listed on the Bid Proposal Form. Each Alternate value shall include all work required for its complete execution of work, including all supervision, overhead, profit and bond costs. Accepted Alternates will be fully considered in awarding a contract.

B. In its sole discretion, TPM reserves the right to accept or reject any or all Alternates and to award the Contract to the lowest eligible responsible Bidder based on the Base Bid and the Alternates that are accepted at that time.

C. TPM shall be allowed a period of one hundred twenty (120) calendar days after Award of Contract to exercise the right to accept or reject any or all alternates submitted on the bid proposal.

D. Bids are considered irregular and may be rejected if alternates contained in the bid proposal are obviously unbalanced either in excess of, or below, reasonable cost analysis values as determined at the sole discretion of the TPM.

1.8 BID SECURITY AND BONDS

A. Each Bid Proposal must be accompanied by security in the form of a Bid Bond duly executed by the Bidder as Principal and having as surety thereon, a company authorized to execute such bond in the State of Florida and which company is satisfactory to Jacobs|Titan. The amount of such Bid Security shall be five percent (5%) of the amount bid. An attorney-in-fact who signs a Bid Bond must file with the Bond a certified and effectively dated copy of his power of attorney. The Bid Security shall be made in favor of Jacobs|Titan, A Joint Venture and shall become its property in the event the Bidder fails, within seven (7) days after receipt of Notice of Award for the amount of the Bid Proposal, to both execute said agreement, deliver the Performance Bond, Payment Bond, and the proper Certificate of Insurance. The premiums for said Bonds shall be the responsibility of the Bidder and are included in the Contract Price. The Bid Bond must be submitted on the form attached hereto. The Performance Bond and Payment Bond are to be in the format required under Florida Statutes 255.05 and be executed by such sureties as are acceptable to TPM and are licensed to do business in the State of Florida.

B. The surety company must have an A. M. Best rating of "A" or be listed as a company approved by the Federal Register of the U. S. Department of Treasury for "Surety Companies Acceptable on Federal Bonds" and be certified to issue the total amount of the bond on any one risk. For Bids less than $500,000.00, bonds from a surety company meeting Section 287.0935 of the Florida Statutes are acceptable.

C. Bid Bonds will be returned to successful bidders after a contract agreement has been executed,

and acceptance of required bonds and insurance is made. The Bid Bonds of bidders not under consideration for award of contract will be returned by the TPM in a timely manner. The bid security of the lowest two bidders may be retained for a period not to exceed sixty (60) days after date for receipt of bids, or until a contract is awarded.

D. Every Bid Proposal Form that is **not** accompanied by a Bid Bond will be **rejected.**

1.9 SUBMISSION OF BIDS AND BID PROPOSAL FORMS

A. Each Bid Proposal shall be submitted on the Bid Proposal Form bound in the Contract Documents. The Bid Proposal Form may be copied from the one bound in the Contract Documents. All blank spaces shall be filled in ink or typewritten, in words and figures, in figures only where no space is provided for words and signed by a legally authorized representative of the Bidder that can bind the Bidder to the Contract. If Bids are submitted by an agent, provide satisfactory evidence of agency authority. Bids on a form not completely filled in, or which is not complete, or which is conditional, qualified, or obscure, or which contains any addition not called for, may be considered non-responsive and rejected.

B. The Bid Proposal Form, including the Bid Bond and the Public Entity Crime Form shall be enclosed in a sealed envelope with the following plainly marked on the outside:

Jacobs|Titan
Total Program Manager
School Board of Okaloosa County Program Office
4008 Legendary Drive, Suite 600,
Destin, FL 32541
Attention: Program Manager

SCHOOL BOARD of OKALOOSA COUNTY, DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER

General Contracting Package
(BIDDER NAME, ADDRESS AND PHONE NUMBER)

If the bid is mailed, the Bidder shall enclose his sealed bid in an outer envelope, addressed as follows:

From: Bidder's Name and Business
Address

To: Jacobs|Titan
Total Program Manager
School Board of Okaloosa County Program
Office 4008 Legendary Drive, Suite 600,
Destin, FL 32541
Attention: Program
Manager SEALED BID
ENCLOSED

C. All Bidders are cautioned to allow ample time for the transmission of Bids. Bids received after the specified time will not be accepted or recognized. The time of receipt will determine the acceptability of mailed Bids, regardless of postmark.

D. Jacobs|Titan will not be responsible for premature opening of bid envelopes not properly addressed and marked.

Jacobs/Titan – A Joint Venture
School District of Okaloosa County Program Office
4008 Legendary Drive, Suite 600, Destin, FL 32541
850.897.8125 Fax: 850.897.0123

E. Any expense or costs incurred by the Bidder in the preparation of his Bid Proposal will be at the sole cost and expense of the Bidder.

F. The Bid Proposal form will not be considered a Contract Document.

G. With the submission of their Bid, the bidder represents that they have read and acknowledge that the Project Schedule is acceptable.

H. Oral, telephone, facsimile, or telegraphic bids are invalid and will not be considered.

I. The Bid is to be based solely on the labor, materials, systems and equipment necessary to complete the Work described by the Contract Documents.

1.10 RIGHT TO ACCEPT AND REJECT BIDS

A. The TPM reserves the right to waive any informalities and irregularities in any Bid or to reject any or all Bid Proposals.

1.11 METHOD OF AWARD AND EXECUTION OF CONTRACT

A. It is the intent of the TPM to award a Contract to the lowest responsible and responsive bidder from the list of Pre-Qualified Bidders provided the Bid has been submitted in accordance with the requirements of the Contract Documents and does not exceed the funds available. The Bidder shall receive a Notice of Award for signature and the date this Document is received by the Bidder will be considered the beginning of the Contract time.

B. The Bidder is required to return a signed and dated copy of the Notice of Award to the TPM. If the Contractor fails to furnish Contractor's Performance Bond, Public Payment Bond, and Certificate of Insurance within seven (7) calendar days from the date of the Notice of Award and concurrent with the execution of the Contract, TPM will be entitled to consider all the Bidder's rights arising out of TPM acceptance of the Bidder's Bid as abandoned and as a forfeiture of the Bidder's Bid Bond. TPM will be entitled to such other rights as may be granted by Law.

C. The Bidder who is selected shall execute a Contract with Jacobs|Titan within ten (7) calendar days after receipt of Notice of Award. Upon receipt by TPM of executed Contract and the required bonds, the Contractor shall be issued a Notice to Proceed with the Contract Work.

D. The term "Contractor" referred to throughout the Contract Documents means the construction firm that enters in a Contract with Jacobs|Titan, the Total Program Manager (TPM).

E. The form of Contract that will be used is the Contract for Construction Services included in the Bid Documents.

F. Bidder who is selected shall also provide evidence of other insurance required under the Contract Documents prior to starting any work on the project.

G. The Bidder agrees to commence administrative and submittal work under this Contract immediately upon Notice of Award and to substantially complete the Work by the date specified in the Contract. The time period allotted for the Work (Contract Time) begins on the date that the successful Bidder receives the "Notice of Award".

H. The sequence of construction and Milestone Dates for major work items are listed in Attachment F to the Contract for Construction Services. The Contractor shall be familiar with Article 5, Paragraph 5.3.1 of the Contract with respect to weather and shall plan accordingly.

I. The successful Bidder will supply a complete list of subcontractors to TPM within three (3) days after the Bid opening. Major subcontractors must be identified on 00300 Bid Form and submitted with the bid.

J. The successful Bidder will execute attachments C, D and E within seven (7) days after the Notice

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of Award.

K. Time is of the essence in the Work to be provided under this Contract. **After the successful Bidder receives a "Notice to Award", the time allotted for the Work begins.** The Bidder agrees to substantially complete the Work on or before the date scheduled for Substantial Completion.

L. The schedule requirements are detailed in Division 1, section 01315.

1.12 SUPERVISION

A Each Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during the progress of his Work. The superintendent shall be satisfactory to the Owner and Jacobs|Titan, unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. The listed staff will not be replaced or substituted without TPM approval of replaced or substituted staff.

B. Safety Representative: The Contractor shall employ a competent trained safety representative who shall be in attendance at the Project site a minimum of one (1) hour per workday, whenever work is in progress. The contractor's safety representative shall ensure that Contractor's safety program is being fully implemented and meets all requirements of the contract documents. The qualifications of the Contractors safety representative must be acceptable to the TPM.

1.13 SCHEDULE OF VALUES

A. In the preparation of the Bid Proposal, the Bidder should be aware of the requirement that each successful Bidder shall submit his Schedule of Values in a form as required by the TPM.

1.14 COMPLIANCE WITH LAWS

A. The Bidder is required to be familiar with all Federal, State and Local laws, ordinances, rules and regulations that in any manner affect the Work.

B. Contractor shall secure and pay for all permits and governmental fees, licenses and inspections necessary for the proper execution and completion of his Work and shall furnish a copy of said permits, licenses and inspection reports to the TPM.

C. Bidders must be authorized to do business in the State of Florida and in Okaloosa County and must possess all required construction licenses in accordance with applicable State and local laws, rules, and regulations.

End of Instructions to Bidders

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School District of Okaloosa County Program Office
4008 Legendary Drive, Suite 600, Destin, FL 32541
850.897.8125 Fax: 850.897.0123

SECTION 00300
BID FORM

Date: _____

Bid of *_____

(hereinafter called "Bidder") a **_____organization

and existing under the laws of the State of Florida.

* Insert name of firm.
** Insert corporation, partnership or individual, as applicable.

TO: Jacobs|Titan Technologies, A Joint Venture
Total Program Manager
4008 Legendary Drive, Suite 600,
Destin, FL 32541

GENTLEMEN:

The Bidder, in compliance with the Invitation to Bid for the furnishing of labor, materials and equipment for the Destin Elementary School 3/4/5 Center and having examined the Contract Documents for the Destin Elementary School 3/4/5 Center Contracting Package and other related documents and being familiar with the site of the proposed work, and with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, and the progress of work to date, if any, hereby proposes to furnish all labor, materials, tools, equipment, machinery, equipment rental, transportation, superintendence, perform all work, provide all services, and to construct all work in accordance with the Contract Documents set forth herein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required.

After Bid Proposals are received, tabulated and evaluated by the TPM, said Bidder agrees to meet immediately with the TPM for purposes of reviewing the Bid in detail for compliance. For purposes of these meetings, the Bidder agrees to provide a complete, detailed cost breakdown; a list of all subcontractors proposed for use in the work; and a list of all items, materials and their manufacturers proposed for use in the work.

The Bidder, if awarded a Contract, agrees to begin the Contract Time immediately upon “Notice of Award”, to commence work on-site immediately upon “Notice to Proceed” and to fully complete its Work in accordance with the schedule established in the Contract Documents.

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BASE BID

DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER. The undersigned agrees to perform all Work as described in the Contract Documents, for the lump sum of:

_____ DOLLARS ($_____),

which includes the amount of:

_____DOLLARS ($_____),
to

cover the cost of the Performance and Payment Bonds.

Trane HVAC Equipment and Controls Package

_____DOLLARS ($_____),

(Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

Note: Bidder acknowledges and understands the Scope of Work for this Project as listed in Attachment A.

Pre-Qualified Bidders must list their qualified major subcontractors:

1. Mechanical (HVAC) _____
   Discipline Subcontractor Name
2. Plumbing _____
   Discipline Subcontractor Name
3. Electrical _____
   Discipline Subcontractor Name
4. Roofing _____
   Discipline Subcontractor Name
5. Masonry _____
   Discipline Subcontractor Name
6. Site/Civil _____
   Discipline Subcontractor Name
7. Flooring _____
   Discipline Subcontractor Name
8. Asphalt _____
   Discipline Subcontractor Name

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9. Concrete _____
Discipline Subcontractor Name

10. Windows/Glazing _____
Discipline Subcontractor Name

11. Doors/Frames _____
Discipline Subcontractor Name

12. Windows/Glazing _____
Discipline Subcontractor Name

13. Elevator _____
Discipline Subcontractor Name

14. Structured Cabling _____
Discipline Subcontractor Name

15. Fencing _____
Discipline Subcontractor Name

16. Casework _____
Discipline Subcontractor Name

ALTERNATES

Bidder must bid on each alternate listed below. The value of each alternate shall include all work required for its complete execution including all supervision, overhead, profit and bond cost.

Alternate No. 1: Deduct if TPM or Owner provides Builder's Risk Insurance outlined in Section 9.2.3 of the Contract for Construction Services.

Deduct _____ Dollars ($_____)

ACKNOWLEDGEMENTS

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work, and that he will comply fully with all laws and regulations applicable thereto.

All applicable taxes, including sales and use taxes on materials and equipment, which are affixed and made a part of the real estate of the Project, are included in the above Base Bid. Bidder agrees that this Base Bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the opening date of Bid Proposals.

Within seven (7) days after receipt of the Notice of Award for the amount of this Bid Proposal, the undersigned will execute said agreement and deliver the Performance and Payment Bonds and Certificates of Insurance to the TPM.

The Bid Security attached to this Proposal is to become the property of the TPM in the event the Contractor does not properly execute the Contract and deliver properly executed Performance and Payment Bonds and Certificates of Insurance within the time above set forth, as liquidated damages

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for the delay and additional expense to the TPM caused thereby.

The undersigned understands that the TPM reserves the right to reject any or all Bid Proposals and to waive any informalities or irregularities therein.

Bidder acknowledges receipt of the following addenda (identify no. and date of each):

_____.

_____.

If awarded a contract, bidder's surety will be: $_____

The bond premium associated with this Contract is: $_____

The Bidder acknowledges that the "Certification Related to Subcontractor Qualifications" has been completed, signed and included with this Bid Form.

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CERTIFICATION RELATED TO SUBCONTRACTOR QUALIFICATIONS

The undersigned in connection with its bid to furnish all labor and materials required for the construction of the Contract Work hereby agrees, certifies and attests to the TPM that:

1. All Subcontractors and Suppliers proposed to be used by the undersigned on the project will be submitted by the undersigned to the TPM within one (1) day after the Bid opening.

2. None of the undersigned's Subcontractors or Suppliers are now suspended, disqualified, prohibited, barred, denied or otherwise precluded by any federal, state, regional, county, municipality or other local government authority or agency from bidding or working on any contracts (construction or otherwise) with such government entities and the undersigned shall not use any such disqualified Subcontractor for this project.

The undersigned agree to the provisions of the contract documents and hereby affix authorized signature(s) representing (check one):

_____ An individual doing business as:_____

_____ A partnership

_____ A corporation

Name of Bidder:

_____

Business Address:

_____

Telephone Number:

_____

Signature: _____

Name (*Print*):_____

Title: _____

Contractor License Number: _____

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SECTION 00340
BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____ (here insert full name and address or legal title of Contractor) as Principal, hereinafter called the Principal, and _____(here insert full name and address or legal title of Surety) a corporation duly organized under the laws of the State of as Surety, hereinafter called the Surety, are held firmly bound unto Jacobs|Titan, A Joint Venture, hereinafter called the Obligee, in the sum of five percent of the amount bid, _____ DOLLARS (5% of amount), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for _____
_____
_____.

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter into such contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this _____ day of_____, 2024

(Seal) _____ (Principal)

_____
(Witness)
(Title) _____

(Seal) _____ (Surety)

_____
(Witness)

_____
(Title)

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4008 Legendary Drive, Suite 600, Destin, FL 32541
850.897.8125 Fax: 850.897.0123
Contract #: 635CDESES345GC

SECTION 00400
CONTRACT FOR CONSTRUCTION SERVICES

This Contract is made and entered into this **##** day of **[Month]**, **2024**, between Jacobs/Titan Technologies, A Joint Venture ("Jacobs/Titan" or "TPM"), **4008 Legendary Drive, Suite 600, Destin, FL 32541,** and **[Contractor Name]**, ("Contractor") whose address is **[Contractor Address]**.

RECITALS:

Jacobs/Titan has entered into a Total Program Management Services Agreement ("Prime Agreement") for a multi-site, multi-project improvement program with the School Board of Okaloosa County, Florida ("Owner"); and

Jacobs/Titan requires Contractor to provide certain construction services as defined in this Contract, for the project known as **Task Order 35C, Destin Elementary School 3/4/5 Center**

Contractor is experienced and skilled in providing the type of construction services required by this Contract and is willing and able to enter into a contract with Jacobs/Titan to perform such services.

In consideration of the mutual covenants and agreements set forth herein, Contractor and Jacobs/Titan agree as follows:

ARTICLE 1
GENERAL PROVISIONS

1.1 Definitions

1.1.1 The Project is **Task Order 35C, Destin Elementary School 3/4/5 Center,** to be located on the property of Owner, situated in Okaloosa County, Florida.

1.1.2 The Contract Work is the construction labor, materials, tools, equipment and supervision required under this Contract as described in the Contract Documents. The Contract Work may constitute the whole or a part of the Project.

1.1.3 The Total Program Manager ("TPM") is Jacobs/Titan Technologies, A Joint Venture. TPM shall be the general administrator and coordinator for the Contract Work and other work in relation to the Project. TPM shall have the rights and responsibilities ascribed to it by this Contract.

1.1.4 The Contract Documents, which constitute the entire agreement between Contractor and TPM, consist of:

1. This Contract and the following Attachments:

Attachment A	Scope of Work
Attachment B	Drawing List
Attachment C	Prohibition Against Contingent Fees
Attachment D	Non-Discrimination Statement
Attachment E	Public Entity Crimes Statement
Attachment F	Milestone Schedule
Attachment G	Health, Safety & Environmental Requirements
Attachment H	Mold Prevention Program
Attachment I	Partial Release and Affidavit
Attachment J	Final Release and Affidavit
Attachment K	Supplemental Conditions

2. Project Manual: Plans and Specifications including Divisions 0 and 1

3. Change Orders

1.1.5 Should any inconsistencies or ambiguities appear in the Contract Documents or should there be any work inherent to the scope omitted, it shall be the duty of Contractor to so notify TPM in writing within three (3) working days of Contractor's discovery thereof. Upon receipt of this notice, TPM will instruct Contractor as to the measures to be taken and Contractor shall comply with TPM's instructions.

1.2 Extent of Contract. The Contract Documents represent the entire agreement between the Contractor and TPM and supersede all prior negotiations, representations or agreements. This Contract shall not be superseded by any provisions of the documents for construction and may be amended only by written instrument signed by both Contractor and TPM.

ARTICLE 2
CONTRACTOR'S RESPONSIBILITIES

2.1 Contractor's Work. Contractor shall furnish all labor, materials and equipment, supervision, inspection, testing, tools, construction equipment and specialty items necessary to execute and complete the Contract Work. Contractor warrants that it has inspected the site and has satisfied itself regarding all conditions affecting the Contract Work and the meaning and intention of the Contract Documents. Contractor is solely responsible for the means, methods, techniques, sequences, procedures and coordination of the Contract Work.

2.2 Workmanship and Construction Equipment. The Contract Work shall be executed in accordance with the provisions of this Contract and in a thorough, first-class, sound, workmanlike, safe, and substantial manner. All construction equipment shall be in first-class operating condition, safe, fit for the uses for which intended, and suitable for the safe and efficient performance of the Contract Work. Contractor agrees to perform the Contract Work and provide construction equipment to the satisfaction and approval of TPM.

2.3 Schedule

2.3.1 Time is of the essence. Contractor agrees to commence administrative and submittal work under this Contract immediately upon Notice of Award and to Substantially Complete the Contract Work by the date specified in the Contract. The time period allotted for the Contract Work (Contract Time) begins on the date that the Contractor receives the “Notice of Award.” Upon receipt by the TPM of the executed Contract and the required bonds, the Contractor will be issued a Notice to Proceed with the Contract Work. Contractor will complete the Contract Work within the period of time set forth in the Contract Documents and as indicated in the Contractor's Schedule prepared pursuant to this Section. Within Forty-Five (45) days following written Notice to Proceed, the Contractor shall propose a CPM activity network and a computer-generated schedule in a format acceptable to TPM which at a minimum includes activity durations, dependencies, planned procurement dates, and planned submission dates of required submittals.

2.3.2 Contractor's proposed schedule shall anticipate the usual amount of delay from all causes encountered in the locale of the site and for the type of work involved. TPM shall review the proposed schedule and make such revisions as are necessary to make it consistent with the Schedule for the Project. Upon approval by TPM, the schedule submitted by the Contractor will be the contract schedule (Contract Schedule).

2.4 Compliance with Law

2.4.1 Contractor shall give notices and comply with laws, ordinances, rules, regulations and orders of public authorities bearing on performance of the Contract Work. The Contractor shall secure and pay for permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Contract Work.

2.4.2 Contractor shall comply with federal, state and local tax laws, social security acts, unemployment compensation acts and workers' or workman's compensation acts, insofar as applicable to the performance of this Contract.

2.4.3 Contractor represents it has a valid license authorizing it to do business within the political unit or municipality of the Project site if such license is required and agrees to maintain same throughout the duration of the Contract Work at its expense.

2.5 Accounts and Schedule of Values Contractor shall keep such accounts as may be necessary for financial management under this Contract. Contractor shall base its Applications for Payment on the Schedule of Values approved by TPM. In the event the Schedule of Values is changed as a result of a Change Order, a new Schedule of Values will be approved by TPM and shall be used for all subsequent Applications for Payment.

2.6 Cooperation/Coordination

2.6.1 Contractor shall cooperate with TPM and TPM's other contractors and subcontractors in scheduling and performing the Contract Work to avoid conflict, delay or interference in the project or in the Work of TPM or TPM's other contractors or subcontractors. Contractor shall avoid interference with the operation of adjacent facilities, streets, sidewalks, railroad tracks and utilities.

2.6.2 If any part of the Contract Work depends on timely and proper execution or results of the work of TPM or TPM's other contractors, Contractor shall promptly report any delays, discrepancies or defects in such other work to TPM in writing before proceeding with the Contract Work. Contractor's failure to make such reports shall constitute acceptance of such other work as being fit, proper, and ready to receive the Contract Work.

2.6.3 If the Contract Work takes place in or around an existing facility, Contractor shall abide by the Owner's rules for the facility; Contractor's access to the facility will be restricted to those areas which are the subject of the Contract Work; and there shall be no interruption in Owner's operations or services without the written authorization of TPM.

2.6.4 Contractor shall protect benchmarks and monuments whether of record or by other contractors or subcontractors and replace same if damaged by Contractor.

2.6.5 Contractor shall use the site entrances and staging and parking areas (if available) designated by TPM.

2.7 Submittals

2.7.1 Contractor shall prepare or cause to be prepared, all shop drawings, samples, and other submittals, which are required by the Contract Documents or are necessary to the performance of Contractor's obligations hereunder. Such submittals shall bear the Contractor's approval stamp and shall be submitted to TPM in accordance with the Contract Schedule and in any case in time to permit adequate review by TPM and the Project Architect and in such sequence as to cause no delay in the Project or in the work of TPM or TPM's other contractors or subcontractors.

2.7.2 By approving and forwarding submittals, Contractor represents that it has determined and verified all materials, field measurements, and field construction criteria related thereto, and that it has checked and coordinated the information contained within such submittals with the requirements of the Contract Work and of the Contract Documents.

2.7.3 Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents or for errors or omissions in the submittals by TPM's approval thereof.

2.7.4 Contractor shall direct specific attention, in writing or on resubmitted submittals, to revisions other than those requested by TPM on previous submittals.

2.7.5 No portion of the Contract Work shall be undertaken until the submittals required by the Contract Documents have been reviewed by the TPM and approved by the Project Architect.

2.7.6 Submittals and RFI's shall be electronically submitted through the TPM's Document Management System. TPM will provide user access and necessary training for the TPM's Document Management System for Contractor. Submittals shall be submitted as PDF files; submittals that are not received as PDF files via TPM's Document Management System will not be reviewed.

2.8 Royalties and License Fees Contractor shall pay royalties and license fees required by the Contract Work. Contractor shall defend suits or claims for infringement of patent or copyright rights and shall save TPM and Owner harmless from loss on account thereof, except that TPM will be responsible for such loss when a particular design, process or product or a particular manufacturer is required by TPM.

2.9 Clean Up Contractor shall keep the premises in which Contract Work is performed, or which is used or affected by the Contractor, free from the accumulation of trash and other debris caused by its operations. If Contractor fails to comply with this Section within twenty-four (24) hours after receipt of notice of non-compliance from TPM, TPM may perform such necessary cleanup and deduct the costs for same from any amounts due or to become due to Contractor. At the completion of the Contract Work, Contractor shall remove its tools, surplus materials, temporary construction, construction equipment and machinery from the Project site and leave the premises "broom clean" or cleaner if so provided in the Contract Documents.

2.10 Record Drawings Contractor shall maintain one reproducible record copy of the drawings, specifications, product data, samples, shop drawings, Change Orders and other modifications in good order at the site. They shall be marked currently to record changes made during construction. They shall be delivered to and become the property of TPM upon completion of the Contract Work or termination under Article 10 of this Contract.

2.11 Reports and Communication Contractor shall furnish TPM with periodic progress reports on Contract Work as requested, including information on the status of materials and equipment which may be in the course of preparation, manufacture or delivery. Contractor's communications concerning the Contract Work shall be exclusively with TPM which, in its sole discretion, shall determine what to communicate to the Owner or other contractors or subcontractors.

2.12 Property Contractor shall take necessary precautions to protect its property, the Contract Work, and the work and property of other contractors and subcontractors, Owner and TPM whether located on or off the Project site, from damage or loss caused by operations under this Contract. Contractor shall also take the necessary precautions to protect property off the Project site from damage or loss caused by its operations including, but not limited to, adjacent facilities, streets, sidewalks, railroad tracks and utilities. Contractor shall be responsible for damages or loss caused by its operations to the extent not covered by insurance.

2.13 Representative Five (5) days prior to commencement of the Contract Work, Contractor shall furnish to TPM written designation of its representative who shall be at the site to represent Contractor, and to receive notices, orders and instructions on Contractor's behalf, and to be in charge of and responsible for Contract Work. Contractor's representative shall be competent, fully acquainted with the Contract Work, and have the authority to approve changes in the Contract Work. Contractor's representative shall render approvals and decisions promptly and furnish information expeditiously and in time to meet the dates set forth in the Contract Schedule. Such representative shall be at the site whenever Contract work is being performed.

2.14 Labor

2.14.1 Contractor shall supply a sufficient and adequate number of properly skilled workers and competent supervisors to insure the prompt and efficient performance of the Contract Work in accordance with the Contract Schedule.

2.14.2 Contractor shall plan and conduct its operations so that its employees will work in a harmonious relationship with other labor at the site. Contractor shall not permit work stoppages or labor disputes of any kind.

2.14.3 Contractor assumes all responsibility for any loss or damage attributable to any labor difficulty of any kind caused by it or its employees.

2.15 Safety Precautions and Procedures

2.15.1 Contractor shall be solely responsible for protecting its employees and all other persons from risk of death, injury or bodily harm arising out of or in any way connected with the Contract Work. Contractor shall furnish a written designation listing its Safety representative(s) responsible for implementation and enforcement of Contractor's safety program. Such Safety representative shall be fully trained to act in the capacity of Site Safety Representative. A properly qualified Safety Representative of Contractor other than Contractor's Project Supervision shall be at the Site a minimum of (1) hour per workday and shall be fully focused on safety matters pertaining to the Project. In the event Contractor's site-specific Total Recordable Incident Rate (TRIR) on this project exceeds 10.0, TPM reserves the right to require Contractor to provide a full-time HSE professional on-site at no additional cost to TPM. Additionally, should Contractor's total number of personnel (including all subcontractors) at the Project site exceed 35, Contractor shall provide a full-time HSE professional on-site at no additional cost to TPM.

2.15.2 Contractor agrees to comply with all applicable federal, state, city and county laws, ordinances, rules and regulations for the safety of persons or property in the performance of the Contract Work including, but not limited to, the requirements of the Occupational Safety and Health Act of 1970, and amendments and regulations promulgated and issued pursuant thereto. Any contractor personnel involved in an accident will be required to submit to a post-incident drug and/or alcohol test as part of the investigation of such incident.

2.15.3 Contractor shall develop and enforce a written safety program to ensure compliance with the obligations under Section 2.15 and Attachment G - TPM Health, Safety and Environment Requirements. TPM will review the program for the limited purpose of determining that Contractor has a legitimate program and not to determine its adequacy. TPM will monitor Contractor's program at the site in connection with TPM's general inspection functions. TPM's review of such program or monitoring of Contractor's enforcement efforts does not in any way absolve or relieve Contractor from its sole responsibility for safety. Contractor shall report all injuries to its employees, agents, subcontractors, suppliers and/or materialmen to TPM within twenty-four (24) hours of occurrence and provide TPM with a copy of its accident report.

2.15.4 Contractor shall provide sufficient, safe and proper facilities, labor and material needed for the access and inspection of Contractor's Work by TPM and TPM's other contractors and subcontractors.

2.15.5 Contractor agrees to comply with the "Hazard Communication Standard" of the Occupational Safety and Health Administration. To the extent required by such standard, Contractor will adopt and implement a written hazard communication program to protect its employees from potential exposure of hazardous chemicals at the job site and will provide lists or inventories of hazardous chemicals in its possession at the job site, warning and handling labels for such chemicals, and material safety data sheets for such chemicals to TPM.

2.15.6 When the use or storage of explosives or other hazardous materials or equipment is necessary for execution of the Contract Work, Contractor shall carry on such activities with properly qualified personnel under properly qualified supervision. Contractor shall notify TPM forty-eight (48) hours in advance of any such material being stored and/or used on the project site.

2.16 Warranties

2.16.1 Contractor warrants that all materials and equipment furnished under this Contract will be of good quality and new, unless otherwise specified, and that all work will be of good quality, free from improper

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workmanship and defective materials, and that all work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized by TPM, may be considered defective. This warranty does not include defects caused by Owner after substantial completion, abuse, improper maintenance or improper operation, or modifications that have not been submitted to Contractor for review and approval under this Contract and to which Contractor has made relevant written exceptions. Contractor agrees to correct all Contract Work performed and material supplied by it including labor furnished by its subcontractors in connection with the construction of the Work under this Contract which prove to be defective in quality, material or workmanship within a period of one (1) year from the date of Substantial Completion as defined in Paragraph 5.2 or for such longer period of time as may be provided in the Contract Documents. This warranty relates only to the Contractor's obligation to correct work and does not otherwise limit TPM's legal remedies against Contractor for work performed which proves to be defective in design furnished, quality, material or workmanship which TPM may enforce at any time during applicable statute of limitations. This warranty is in addition to other express warranties contained elsewhere in the Contract Documents.

2.16.2 Contractor shall collect all equipment manuals and deliver them to TPM within 30 days of Substantial Completion, together with all written warranties or guarantees from equipment manufacturers.

2.16.3 Contractor warrants that goods or services delivered or sold to TPM contain no counterfeit parts. Counterfeit part means an unlawful or unauthorized reproduction, substitution, or alteration that has been knowingly mismarked, misidentified, or otherwise represented to be an authentic, unmodified part, including an electronic part, from the original manufacturer, or a source with the express written authority of the original manufacturer or current design activity, including an authorized aftermarket manufacturer. Unlawful or unauthorized substitution includes parts represented as new, or the false identification of grade, serial number, lot number, date code, or performance characteristics. Electronic part means an integrated circuit, a discrete electronic component (including, but not limited to, a transistor, capacitor, resistor, or diode), or a circuit assembly.

2.17 Field Office Contractor shall provide an office trailer complete with all necessary utilities (power, internet, water, sewer, etc.) needed for its own use. At a minimum, Contractor shall provide TPM an office trailer complete with all necessary utilities (power, internet, water, sewer, etc.) with 2 individual offices, restroom and a conference space. TPM will be responsible for any long-distance charges that TPM makes. Location of such facilities shall be subject to approval by TPM and shall be subject to relocation at Contractor's expense. Any temporary installation required for these facilities shall be paid for by Contractor. Contractor shall be responsible for the security and protection of its materials, equipment and tools..

2.18 Equipment and Materials

2.18.1 Contractor shall be responsible for arranging for the shipment of materials and equipment which it is to provide to the Project site and shall consign all such shipments to itself as consignee at the Project shipping address, freight fully prepaid. Contractor shall make all delivery payments promptly, including any demurrage charges.

2.18.2 Contractor shall advise TPM in advance of all major shipments of equipment and materials and shall coordinate the arrival and unloading of same with TPM.

2.18.3 Contractor shall promptly unload its shipments and promptly release its carrier's equipment. In the event Contractor is unable to promptly unload a shipment, Contractor shall notify TPM of such inability not less than five (5) working days in advance of the shipment's arrival. TPM, at its sole option, may unload or make arrangements for others to unload such shipments and Contractor will be responsible for the cost thereof.

2.18.4 Contractor shall store and install all materials and equipment necessary for the Contract Work in such a way as to preserve their quality and fitness which includes, but is not limited to, actions required to protect same from damage due to weather, fire, theft, and construction operations. This responsibility begins when Contractor accepts delivery of the materials and equipment and continues until Substantial Completion.

2.19 Contractor shall provide all layout as is necessary for completion of the Contract Work.

ARTICLE 3
TPM'S RESPONSIBILITIES AND RIGHTS

3.1 Information TPM will make information which affects the Contract Work and which becomes available to TPM promptly available to Contractor.

3.2 Instructions TPM shall give instructions or orders only to persons designated as authorized representatives of the Contractor.

3.3 Notice of Hazardous Chemicals TPM agrees to comply with the "Hazard Communication Standard" of the Occupational Safety and Health Administration.

3.4 Stop Work Orders TPM may order the Contract Work or any portion of the Contract Work stopped when Contractor fails to correct work not in conformance with the Contract Documents or fails to supply adequate labor, materials or construction equipment or fails to correct a hazardous condition until the cause for such order has been eliminated. TPM's failure to exercise this right does not absolve Contractor of its responsibilities.

3.5 Completing and Correcting Work After giving forty-eight (48) hours written notice to Contractor or immediately after verbal and/or written notification, TPM may complete or correct any part of the Contract Work which Contractor has neglected or shown itself otherwise unable to expeditiously complete or correct and deduct the cost of doing so from Contractor's payments. If the work not accomplished involves more than one contractor, the cost will be divided in accordance with TPM's determination. TPM may avail itself of the above procedure and of such other rights and remedies, which are available under this Contract, applicable law, or both.

3.6 Insurance In the event TPM or Owner provides Builder’s Risk Insurance, Contractor will upon request be provided with information concerning any Builder's Risk insurance covering the Project. It shall be Contractor’s responsibility to verify that Builder’s Risk Insurance is in place prior to commencing work.

ARTICLE 4
SUBCONTRACTS

4.1 Selection of Subcontractors Contractor shall submit to TPM a list of its subcontractors and material men with a description of the corresponding items of work three (3) days prior to the execution of this Contract and in any event prior to commencing the Contract Work. TPM reserves the right to approve or disapprove any organization listed thereon for any reason. The list shall be updated as necessary by Contractor. Contractor shall select competent subcontractors and shall be responsible for the management of its subcontractors' performance of their work.

4.2 Subcontracts No contractual relationship shall exist between TPM and any of Contractor's subcontractors. Contractor shall use an appropriate written subcontract for its subcontractors under which its subcontractors assume all obligations and responsibilities Contractor has assumed toward TPM under the Contract Documents including, but not limited to naming TPM and Owner as an additional insured as required at Paragraph 9.2.3 and satisfying all other requirements of Section 9.2.

ARTICLE 5
SCHEDULE

5.1 Contract Schedule

5.1.1 Time is of the essence. The Contract Work to be performed under this Contract shall commence upon execution of this Contract and the issuance by TPM of a Notice of Award, and will progress and be

completed in accordance with the Notice to Proceed and Contract Schedule provided pursuant to Section 2.3.

5.1.2 The term day as used in the Contract Documents shall mean calendar day, unless otherwise specifically designated.

5.2 Substantial Completion and Commencement of Warranties

5.2.1 The date of Substantial Completion or portion thereof of the Project, is the date certified by TPM in accordance with the certificate of substantial completion issued by the TPM.

5.2.2 Owner shall have the right to occupy or use that portion of the Project which has been found to be substantially complete and Contractor shall not be entitled to any extra compensation on account of Owner's occupancy or use, nor shall Contractor be relieved of any of its responsibilities, including the required times of completion.

5.2.3 Warranties or guarantees called for by this Contract shall commence on the date of Substantial Completion of the Project, or designated portion thereof, as reflected by the Certificate of Substantial Completion.

5.3 Delays

5.3.1 If Contractor is delayed at any time in progress of the Work by an act or neglect of TPM, the Owner, or a separate contractor employed by either of them, or by delay due to acts of war, embargo or Force Majeure, acts of God, fire the cause of which is not due to the negligent acts of the Contractor or its subcontractors or employees, or adverse weather conditions not reasonably anticipatable in Okaloosa County, Florida with the express understanding on the part of the Contractor that frequent rain and wind, tropical storms and hurricanes are common to this geographic region based upon published weather standards, then the Contract Schedule shall be extended for the period of such delay upon application therefore by Contractor. Such application shall include documented evidence of a substantial and material impact on the Contract Work and the critical path by the alleged delay. Subject to paragraph 5.3.2, such schedule time extension shall be the exclusive remedy for the Contractor and Contractor expressly waives any rights to additional compensation of any kind whatsoever for any excusable delays under paragraph 5.3.1.

5.3.2 If Contractor is delayed in the commencement, prosecution or completion of the Contract Work for more then ninety (90) days (cumulative), by an act or neglect of TPM, Contractor will be compensated for reasonable and documented Project costs attributable to that portion of the delay which exceeds ninety (90) days (cumulative), and a Change Order will be issued therefore. Contractor hereby waives all claims for damages for delays of ninety (90) days or less. The price adjustment, if any, shall be limited to Contractor's direct material and labor costs and its additional direct costs for, including field supervision, field office costs and rental equipment, incurred during the period of the delay. Contractor hereby waives all claims against TPM or Owner for extended or unabsorbed overhead, disruption and financing costs, lost profits, or consequential damages. Contractor acknowledges that the Contract Price includes the cost of the waivers and limitations contained in this Section.

5.3.3 TPM may direct Contractor to complete the Contract Work ahead of the Contract Schedule or to maintain the Contract Schedule when delays are caused by the circumstances described in this Section 5.3 and the requisite notice and information is provided by Contractor within the time periods prescribed below. Upon written notice from TPM, Contractor shall accelerate the Contract Work and the Contract Price will be adjusted by Change Order. The price adjustment shall be limited to the premium time necessary to accomplish the accelerated Contract Schedule and the fringe benefits and taxes properly allocable to such the premium time.

5.3.4 Contractor shall be responsible to TPM, other contractors and subcontractors for delay damages which arise from Contractor's acts or failures to act. Contractor shall defend, indemnify, and hold TPM

harmless from claims by other contractors and subcontractors for delays which result from or are alleged to result from Contractor's acts or failures to act. The rights and remedies provided in this clause shall be cumulative and not exclusive and shall be in addition to any other rights or remedies TPM may have. Contractor will not be liable for damages when the delay arises out of any of the causes described in Paragraph 5.3.1 above.

5.3.5 Applications for extension of time under the Contract Schedule shall be made to TPM within ten (10) days of the event causing the delay and shall include all pertinent documentation required by TPM to evaluate the application. Likewise, Contractor must provide TPM with ten (10) day's prior notice of its intention to claim compensation hereunder and provide TPM a complete cost breakdown clearly demonstrating the increased cost to be incurred by the Contractor and the effect of delay on the progress of the Work. Any additional application for extension of time made after the initial application has been implemented by Change Order will not be considered unless submitted within the time frames provided for herein, except that an uninterrupted delay that is continuous in nature shall be covered by the initial application.

ARTICLE 6
CONTRACT PRICE

6.1 TPM shall pay Contractor the Lump Sum Amount of:

_____

($_____)* (Contract Price for Contractor's entire performance of this Contract).

6.2 The Contract Price is based upon the Contract Documents and all applicable laws, codes and regulations, and upon the drawings and specifications.

6.3 The Contract Price will be modified for Changes in the Contract Work pursuant to Article 7.

6.4 The Contract Price includes all taxes imposed on the Contractor.

- Includes the following Alternates:
  - TBD

ARTICLE 7
CHANGES IN THE CONTRACT WORK

7.1 Change Orders

7.1.1 For purposes of this clause the term change means any change, addition, or modification in the Contract Work other than as a result of an act or omission on the part of the Contractor or any of its subcontractors. Changes will be performed by Contractor only pursuant to a written Change Order to this Contract issued by TPM. TPM may at any time and without notice to sureties, make changes within the general scope of this Contract.

7.1.2 If a Change Order causes an increase or decrease in the cost of, or the time required for, the performance of any part of the Contract Work, TPM will make an equitable adjustment in the Contract Price, the Contract Schedule, or both upon claim made by Contractor.

7.1.3 The Contractor must assert its right to an adjustment under this Section 7.1 in writing before proceeding with Work under the Change Order but in no event more than seven (7) days from the date of receipt of a written Change Order. Likewise, Contractor must, within this seven (7) day period provide TPM a complete cost breakdown clearly demonstrating the increased cost to be incurred by the Contractor. Failure to agree to any adjustment shall be a dispute under the Dispute Resolutions clause of this Contract.

Prior written notice in accordance with this Paragraph is a condition precedent to any dispute related to a Change Order.

7.1.4 Contractor shall proceed with the Work required in a Change Order upon receipt of the Change Order so as not to delay the progress of the Work, whether or not the Contractor asserts a right to an adjustment.

7.1.5 If Contractor makes changes in the Contract Work without a written Change Order, Contractor shall not be entitled to any adjustment in the Contract Price or Contract Schedule and shall be responsible for any costs or damages incurred by TPM as a result of the change.

7.2 Cost of Work The price adjustment, if any, for a Change Order shall be limited to Contractor's direct material and labor costs and its indirect job site costs, rental equipment, bonding, insurance, and taxes allocable to the Change Order as approved by TPM. A markup of 10% for overhead and profit shall be applied to all labor performed by Contractor with its own forces, and a markup of 5% shall be applied to all other costs. Contractor hereby waives all claims against TPM or Owner for extended or unabsorbed overhead, disruption and financing costs, lost profits, or consequential damages.

7.3 Deductive Changes In the event the Change Order causes a decrease in the cost of the Contract Work, the Contract Price shall be decreased by the Contractor's direct material and labor costs and its indirect job site costs, including field supervision, field office costs, rental equipment, bonding, insurance, and taxes allocable to the deleted Work as approved by the TPM, based upon the most recent Schedule of Values.

7.4 Concealed, Unknown or Hazardous Conditions

7.4.1 If Contractor encounters conditions at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unknown nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then Contractor shall give written notice promptly to TPM but in no event later than ten (10) days after the conditions are encountered and in all cases before the conditions are disturbed. The Contract Price and Contract Schedule will be equitably adjusted for such concealed or unknown condition by Change Order upon presentation by Contractor and concurrence by TPM.

7.4.2 In the event Contractor encounters material reasonably believed to be asbestos or a hazardous substance which has not been rendered harmless, Contractor shall immediately stop work in the area affected and report the condition to TPM. Work shall be resumed as directed by TPM.

ARTICLE 8
PAYMENTS TO CONTRACTOR

8.1 Progress Payments

8.1.1 On or before the tenth (10th) day of each month (a draft copy shall be submitted to the TPM by the fifth (5^{th}) day of the month for review) after the Contract Work has commenced, Contractor shall submit an Application for Payment to TPM for the period ending on the last day of the preceding month which shall indicate the percentage of work completed or material stored at the site for each major segment of work on the Schedule of Values, and the current amounts due therefore. Contractor's Application for Payment shall be submitted, in accordance with Section 01027 of the Specifications, on forms acceptable to TPM with such additional substantiating information as may be requested by TPM. TPM shall have the right of inspection and verification of the Application for Payment. Each Application for Payment shall be accompanied by a Partial Release and Affidavit in the form of Attachment I executed by Contractor. Contractor shall also provide partial lien waivers from its subcontractors and suppliers as required by TPM.

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8.1.2 TPM shall include Contractor's Application for Payment in TPM's next Application for Payment to Owner provided Contractor's Application is timely received, there has been a reasonable opportunity for inspection and verification, and it has been accompanied by the releases and submissions required under Paragraph 8.1.5, below.

8.1.3 TPM shall pay Contractor within ten (10) business days of its receipt of payment by Owner for Contractors Contract work, an amount equal to 95% of the currently due amount. When the Contract Work is Substantially Complete, TPM will retain an amount equivalent to three (3) times the value of the remaining items to be completed or provided by the Contractor until final completion and acceptance of Contractor's Contract work.

8.1.4 TPM may withhold payment for any reasons stated in this Contract or the specifications sections.

8.1.5 Approval of an Application for Payment for stored items on or off the site shall be conditioned on submission by the Contractor of bills of sale and applicable insurance or such other documents satisfactory to TPM to establish TPM's title to such materials and equipment or otherwise protect TPM's interest therein, including transportation to the site. Stored items shall be marked as belonging to TPM upon payment for same.

8.1.6 Contractor warrants and guarantees that title to all Contract Work, materials and equipment covered by an Application for Payment, whether incorporated in the Project or not, will pass to TPM upon receipt of such payment by Contractor, free and clear of all liens, claims, security interests or encumbrances hereinafter referred to as Liens. Contractor shall indemnify, defend and save harmless TPM and Owner against Liens filed on the property of Owner by Contractor's subcontractors, materialmen or suppliers for amounts they claim are due them from Contractor for Contract Work. Within ten (10) days of receiving notice from TPM, Contractor shall obtain the release of any such liens. If Contractor fails to do so within the time provided herein, TPM may satisfy such Liens by payment notwithstanding Contractor's defenses thereto and without liability to Contractor or its surety therefore and may retain out of any payment due, or to become due to Contractor thereafter, an amount sufficient to indemnify TPM and Owner for such payment and any other expenses incurred by either of them as a result of such Lien. Contractor shall also be responsible for the amount of any premium for any bond given by TPM to obtain the discharge of any Lien, or for the interest on any money deposited for the purpose of discharging any Lien.

8.2 Final Payment

8.2.1 Subject to Paragraph 8.2.2, Final Payment shall be made to Contractor when Contractor has achieved final completion in accordance with the requirements of the Contract Documents. Final completion includes, but is not limited to completion of the Contract Work to the satisfaction of TPM; Contractor's payment of all its subcontractors and materialmen; settlement of all claims; payment and recorded release of all mechanics' liens; delivery of all guarantees, warranties, equipment operation and maintenance manuals, record documents, appropriate certificates, and all other required approvals and acceptances by city, county, and state governments, or other authorities having jurisdiction; removal of all rubbish, tools, scaffolding, and surplus materials and equipment from the site; consent to release of Final Payment from Contractor's surety; receipt of appropriate certificates of insurance evidencing continuing insurance obligations; and submittal of Contractor's Final Application for Payment and Final Release and Affidavit in the form of Attachment J.

8.2.2 Final payment to Contractor will be made upon Application for Payment and paid no later than thirty (30) days after inspection and verification by TPM, payment by Owner to TPM, and the satisfaction of all other conditions required for payment. The word "FINAL" shall be placed on the last Application for Payment and Final Release and Affidavit shall be attached thereto. Acceptance of Final Payment by Contractor shall constitute a release and waiver by Contractor of all claims Contractor has or may have against TPM.

8.3 Effect of Payment and Occupancy. Progress payments, partial or entire use or occupancy by Owner and/or TPM shall not constitute final acceptance of any Work not in conformance with the Contract Documents.

8.4 Condition Precedent to Payment. Payment by Owner to TPM for the Contract Work is a condition precedent to Contractor's payment by TPM. Contractor is entitled to payment only for that portion of the Contract Work for which TPM has been paid by Owner. Contractor expressly assumes the risk of nonpayment by Owner.

8.5 Discounts. All discounts for prompt payment shall accrue to the TPM to the extent such payments are paid directly by the TPM or from funds made available by the TPM to the Contractor for such payments. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment, shall be credited to the TPM for all work performed by Contractor on a time and material basis.

ARTICLE 9
INDEMNITY, INSURANCE AND BONDS

9.1 Indemnity

9.1.1 For and in consideration of the sum of $10.00, receipt of which is hereby acknowledged by Contractor, and other valuable consideration exchanged between the Parties, and to the fullest extent permitted by law, Contractor shall defend, indemnify and hold harmless TPM, its Affiliated Companies, the Owner, other contractors, and the directors, officers and employees of each of them (the “Indemnified Parties”) from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of Contractor’s Work, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), caused in whole or in part by any act or omission of the Contractor, or anyone directly or indirectly employed by Contractor or anyone for whose acts Contractor may be liable, regardless of whether it is caused in part by an indemnified party. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this ARTICLE. The obligations of Contractor herein shall extend to any claims which allege liability of an Indemnitee based upon the failure to supervise Contractor, the failure to provide a safe work environment, or other allegations based upon a passive negligence or vicarious liability theory.

9.1.2 In claims against any Indemnified Party under this Section 9.1 by an employee of the Contractor, a subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Section 9.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a subcontractor under workers' or workmen's compensation acts, disability benefit acts or employee benefit acts.

9.2 Insurance

9.2.1 Without limiting the liability of the Contractor under this Contract, Contractor shall purchase and maintain, at its sole expense, the following insurance to cover its operations under this Contract. Said insurance shall be provided by insurance companies acceptable to TPM and licensed to do business in the State of Florida.

1 Worker's Compensation Insurance in full compliance with workers' compensation laws of the states within which any part of the Contract Work is to be performed, together with Employer's Liability Coverage with minimum limits of liability in the amount of $2,000,000 for each occurrence.

2 Comprehensive Automobile Liability Insurance
covering all owned, hired and non-owned vehicles with the following minimum limits of liability:
Combined single limit - $5,000,000 each occurrence

3 Commercial General Liability Insurance, and if necessary Excess liability insurance, which is written on an occurrence basis, with the following minimum limits of liability:

General aggregate	$5,000,000
Products/completed operations aggregate	$5,000,000
Personal and advertising injury	$5,000,000
Each occurrence	$5,000,000
Fire damage	$ 25,000
Medical expense	$ 1,000

9.2.2 Contractors minimum aggregate limits set forth above have not, as of the date of this Contract, been depleted or reduced from occurrences or claims unrelated to this Contract.

9.2.3 **Contractor shall procure and maintain equipment and property insurance for risks covered by a standard Builder's All-Risk policy for the full insurable value of the Project and including equipment, machinery, materials, etc stored off-site or in transit.** Such property and equipment insurance shall include the interests of the TPM, Owner, Contractor and its respective subcontractors. Contractor warrants that the cost of any such insurance is included in the Contract Price payable hereunder. Contractor hereby waives all rights against TPM, Owner, and all other separate contractors for loss or damage to the extent the same is or would be covered by Builders All-Risk policy or any other property or equipment insurance, except such rights as they may have to the proceeds of such insurance. All Work covered by the Contract done at the site and/or in preparing or delivering materials or equipment, to the site shall be at the risk of Contractor exclusively until the completed Work is accepted by TPM and Owner. Contractor shall provide to TPM a complete copy of the Builder's Risk Policy.

9.2.4 The Contractor's Commercial General Liability insurance shall also include blanket Contractual Liability coverage, and will name **Jacobs/Titan Technologies, A Joint Venture and the School Board of Okaloosa County, FL as additional insured**. All required insurance coverage shall be maintained by Contractor during the term of this Contract and for a period of at least five (5) years thereafter. The Commercial General Liability, Auto and required Excess policies shall include severability of interest or cross liability clause and shall be endorsed to be made primary with respect to any applicable insurance maintained by TPM or the Owner. Contractor shall furnish certificates to TPM evidencing satisfaction of the insurance requirements of Section 9.2 before beginning the Contract Work and upon renewal of such coverage during the performance of this Contract. The certificates shall provide that thirty (30) days written notice shall be given to TPM before the policies are changed, non-renewed or canceled. Contractor shall itself give written notification to TPM as soon as it determines that the insurance will not be renewed or receives notice of change or cancellation from its insurance company. The certificates of insurance shall plainly designate the name of the Project. Failure to furnish such certificates shall not relieve Contractor from its obligations under Section 9.2.

9.3 Waiver of Subrogation TPM and Contractor waive all rights against (1) each other and any of their subcontractors, agents and employees, each of the other and (2) the Owner and any of its contractors, agents and employees, for damages caused by fire or other perils covered by property insurance provided by TPM or other property insurance applicable to the Contract Work, except such rights as they may have to proceeds of such insurance held by TPM as fiduciary. The Contractor shall require of its subcontractors, agents and employees, by appropriate agreements, similar waivers in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

9.4 Bonds

9.4.1 Contractor shall furnish performance and payment bonds equal to one hundred percent (100%) of the total amount payable by the terms of the Contract Price as security for the faithful performance and payment of its obligations under this Contract and it shall not be a violation of the terms of the bonds to order changes in the Contract Work. All bonds shall name **Jacobs/Titan Technologies, A Joint Venture and School Board of Okaloosa County, FL as Dual Obligees**. The "Performance Bond" and "Payment Bond" are to be in the format required under Florida Statutes 255.05 and be executed by such sureties as are acceptable to TPM and are licensed to do business in the State of Florida. Sureties providing bonds shall be deemed acceptable to TPM only if it has either a) a current listing on the Department of Treasury Circular TD-570, or b) an AM Best rating of A-minus or better and a Financial Size Category (FSC) of 10 or larger. These bonds shall be provided at the time this Contract is executed and in any event prior to commencing the Contract Work. These bonds shall remain in effect at least until the later of one year after the date when final payment becomes due or Contractor completes its warranty obligations hereunder, except as otherwise provided by law, regulation, or by the Contract Documents. All bonds signed by an agent must be accompanied by a certified and current copy of the authority to act.

9.4.2 If the surety on any bond furnished by Contractor is declared a bankrupt, becomes insolvent, is terminated from its right to do business in the State of Florida, or ceases to meet the requirements of Paragraph 9.4.1, Contractor shall substitute another bond and surety, both of which must be acceptable to TPM, within five (5) days of such event.

9.4.3 The surety, immediately upon being notified Contractor has been terminated for cause, shall communicate with TPM to obtain necessary information. The surety shall not delay the Contract Work or the Project but shall provide for performance of the Contract Work as though termination for cause had not occurred.

9.4.4 Contractor shall require its major subcontractors (including, but not limited to, Mechanical, Electrical, Masonry) to provide performance and payment bonds equal to the value of their subcontracted work.

ARTICLE 10
TERMINATION AND SUSPENSION

10.1 Termination of Prime Contract. This Contract terminates automatically upon TPM's notice to Contractor of termination of the Prime Contract (or in part as it relates to Contractor's Work). If termination of the Prime Contract is attributable in whole or part to any act or neglect of Contractor, the termination shall be considered a termination for cause under Section 10.2 below but Contractor shall not be entitled to any further notice or right to cure. In all other cases, termination of the Prime Contract shall be considered a termination for convenience with respect to this Contract.

10.2 Termination for Cause

10.2.1 If Contractor defaults or repeatedly fails or neglects to carry out the Contract Work in accordance with the Contract Documents, fails to pay subcontractors, or fails to perform the provisions of this Contract or the Contract Documents, or if the Contractor is adjudged a bankrupt, or if Contractor makes an assignment for the benefit of creditors, or a receiver or trustee is appointed on account of Contractor's insolvency, then TPM may give written notice that TPM intends to terminate this Contract. If Contractor fails to correct a default, failure or neglect within forty-eight (48) hours after being given written notice or immediately after notification of a hazardous condition, TPM may, without prejudice to any other remedy, make good such deficiencies and deduct the cost thereof from the payment due Contractor or, at TPM's option, may terminate Contractor and take possession of the site and of all materials, equipment, tools and construction equipment and machinery, whether or not located at the site, and finish the Contract Work by whatever method TPM may deem expedient. Contractor shall immediately turn over all necessary material, contracts, bills of lading for material en-route, and any other correspondence or information which would tend to lessen the cost of completion by others to TPM. Any termination for cause shall be converted into

a termination for convenience automatically in accordance with Section 10.3 should the facts not support termination for cause or should TPM so choose.

10.2.2 When TPM terminates the Contract for cause, the Contractor shall not be entitled to receive further payment until the Project is finished.

10.2.3 If the unpaid balance of the Contract Price exceeds the cost incurred by TPM to finish the Work, the difference shall be paid to the Contractor upon completion of the Project and TPM's receipt of payment from the Owner. If the cost incurred by TPM to finish the Work, and other damages attributable to Contractor's default including TPM's own time and expense, exceed the unpaid balance, the difference shall be paid by Contractor and its surety to TPM upon demand.

10.3 Termination for Convenience

10.3.1 TPM may terminate this Contract without cause upon written notice to Contractor. Contractor shall immediately stop the Contract Work upon receipt of such notice.

10.3.2 Upon termination for convenience, TPM shall reimburse Contractor for any unpaid portions of the Contract Price due under Article 6 to the date of termination plus reasonable termination expenses. No profit will be paid for Contract Work not accomplished. In addition, TPM will also pay Contractor fair compensation, either by purchase or rental at the election of TPM, for any equipment or materials TPM elects to retain. TPM may, at its option, assume and become liable for obligations, commitments and unsettled claims that Contractor has previously undertaken or incurred in good faith in connection with the Contract Work, cancellation penalties for outstanding contracts and undelivered materials or equipment on order, and reasonable demobilization costs. Contractor shall, as a condition for receiving the payments referred to in this Paragraph, execute and deliver all such papers and take all such steps, including the legal assignment of its contractual rights, as TPM may require for the purpose of fully vesting in TPM the rights and benefits of Contractor under such obligations or commitments. TPM's obligation to make any payments under this provision is contingent upon TPM's receipt of payment from Owner for the amounts claimed by Contractor.

10.4 Suspension TPM may, without cause, order Contractor in writing to suspend, delay or interrupt the Contract Work in whole or in part for such period of time as TPM may determine. If the suspension exceeds ninety (90) days, an adjustment shall be made in the Contract Price in accordance with paragraph 5.3.2. In the event the suspension of this Contract is due to a suspension ordered by the Owner under the Prime Contract, TPM's liability to Contractor is limited to the extent of TPM's recovery from the Owner under the Prime Contract for Contractor's costs.

ARTICLE 11
DISPUTE RESOLUTION

11.1 Mandatory Notice and Submission of Claim(s) Contractor agrees to first submit any claim or dispute which it may have against TPM arising out of or relating to this Contract, the Project, the Work, or the breach thereof to TPM in writing prior to initiating any legal action. Contractor shall submit its claim or dispute to TPM within the time periods for notice and submission of claims prescribed elsewhere in this Contract. In the absence of any other stated time period the Contractor shall submit its claim, along with all available supporting documentation, within 10 days from the date on which Contractor knew or should have known of the existence of the claim. TPM may present the Contractor's claim to the Owner if in TPM's opinion, the claim presents issues concerning the Owner's liability to TPM for a price adjustment, schedule extension or other remedy under the terms of the Prime Agreement.

11.2 Negotiation TPM shall have 90 days, or such longer period as the Parties may agree, to seek a negotiated settlement between the Owner, TPM, and the Contractor (Negotiation Period). The Contractor covenants not to sue TPM during this Negotiation Period.

11.3 TPM's Option to Submit Claims To Mediation Prior to expiration of the Negotiation Period, TPM may at its election and option submit the Contractor's claim(s) to mediation before a Circuit Court Mediator certified by the State of Florida. Contractor hereby irrevocably consents to mediation as prescribed above. The Contractor's covenant to forbear legal action shall be extended to include the duration of the mediation process and a period of 5 business days thereafter (Mediation Period).

11.4 TPM's Option To Demand Arbitration Prior to expiration of the Negotiation and/or Mediation Periods, TPM may at its election and option file a notice of demand for arbitration with the American Arbitration Association and with the Contractor with respect to the Consultant's claim(s) as well as for any claim or counterclaim which TPM may have against the Contractor. TPM may exercise its right and option to demand arbitration separately as to each claim made by the Contractor. The Contractor hereby irrevocably consents to arbitration only if such option is exercised by TPM in writing as prescribed above. This agreement and consent to arbitrate will be specifically enforceable in any court having jurisdiction. No arbitration arising out of or related to this Contract shall include any person not a party to this Contract except for the Owner, or TPM's other contractors, any of whom may be joined at TPM's sole election. The arbitrator(s) will not have jurisdiction to consider any claim, counterclaim, or other matter in question where the damages sought are in the nature of punitive damages. The award rendered by the arbitrators will be final, judgment may be entered upon it in any court having jurisdiction. The arbitration award will not be subject to modification or appeal except to the extent permitted by Sections 10 and 11 of the Federal Arbitration Act (9 U.S.C. Sections 10 and 11). It is expressly understood and agreed that Contractor shall rest solely with TPM at its election and option.

11.5 Litigation After expiration of the Negotiation and Mediation Periods and provided TPM has not made a written demand for arbitration, Contractor may litigate any unsettled claim. Any suit filed by Contractor against TPM shall be filed in Florida's First Judicial Circuit in and for Okaloosa County, Florida. The Parties agree that no other court shall have jurisdiction or venue over the Contractor's claim(s). TPM and Contractor consent and submit to the jurisdiction of said court and agree to accept service of process outside the State of Florida in any matter to be submitted to said court.

11.6 Costs and Fees Each Party shall bear its own costs, consulting or attorney's fees, and related expenses. Mediator's and arbitrator's fees and any related costs for conducting the mediation and/or arbitration shall be borne equally by the parties to the mediation or arbitration.

11.7 Continuation of the Work Unless otherwise agreed in writing, Contractor shall carry on the Work and maintain its progress during any dispute and shall comply with all obligations of this Contract, and with TPM's written instructions concerning the matter in dispute.

11.8 Survival This Article shall survive completion or termination of this Contract.

ARTICLE 12
MISCELLANEOUS

12.1 Governing Law This Contract shall be governed by the laws of the State of Florida.

12.2 Access to Records Contractor shall afford access to TPM at all reasonable times to any correspondence, instructions, invoices, receipts, vouchers, memoranda and other records of any kind relating to this Contract, all of which each shall be maintained for a period of three (3) years from and after the date of completion of this Contract. Contractor shall make same available for inspection, copying and audit, in accordance with generally accepted accounting standards, within three (3) days following written notification to Contractor of TPM’s audit request, failing which any claims which are the subject of the Owner's audit request by Contractor shall be withheld until the requested documents are provided.

12.3 Notices All notices, notifications, and communications hereunder wherein Contractor is required to notify TPM, shall be in writing, and shall be delivered, mailed by First Class or certified Mail, postage prepaid, or telecopies to TPM at the address and to the person designated in writing from time to time by

TPM as the person to receive such notices. In the absence of such designation, notices shall be directed to:

Mr. Joel Lindner, Program Manager
c/o OCSD Program Office
4008 Legendary Drive, Suite 600
Destin, FL 32541
joel.lindner@titantechnologies.com

Mr. Jason Abernathy
Managing Principal
775 County Road 1292
Vinemont, AL 35179
jason.abernathy@jacobs.com

12.4 Publicity Any on-site photographs, media releases or other publicity generated by Contractor must be approved in writing in advance by TPM and Owner before publication.

12.5 Successors and Assigns TPM and Contractor each binds itself, its partners, successors, assigns and legal representatives to the other Party to this Contract and to the partners, corporate officers, successors, assigns and legal representatives of such other Party with respect to all covenants of this Contract. Contractor shall not assign this Contract, or any part hereof without the prior written approval of TPM.

12.6 Severability and Waiver The partial or complete invalidity of any one or more provisions of this Contract shall not affect the validity or continuing force and effect of any other provision. The failure of TPM to insist, in any one or more instances, upon the performance of any of the terms and conditions of this Contract, or to exercise any right herein, shall not be construed as a waiver or relinquishment of such terms, conditions or rights.

12.7 Independent Contractor The contractor is an independent contractor. No contractual relationship shall exist between Owner and Contractor.

12.8 Owner's Rights The Owner is a third-party beneficiary to this Contract.

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School District of Okaloosa County Program Office
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850.897.8125 Fax: 850.897.0123
Contract #: 635CDESES345GC

CONTRACTOR: _____

By:_____

Name & Title:_____

Date:_____

JACOBS/TITAN TECHNOLOGIES, A JOINT VENTURE

By:_____

Name & Title:_____

Date:_____

CORPORATE CERTIFICATE

I, _____, certify:
(Corporate Secretary)

1. That I am the Secretary of _____ (Corporation); and

2. That _____ who signed the Contract on behalf of Corporation was then an officer of said corporation and authorized to sign the Contract and other instruments on behalf of said corporation.

3. That entering into a Contract with Jacobs/Titan Technologies, A Joint Venture, for construction services is within the scope of the corporate powers of the Corporation.

4. That the Corporation is in good standing and authorized to do business in the State of Florida.

_____
Secretary

CORPORATE SEAL

The foregoing was acknowledged before me this _____day of _____, 2024

by _____ as Secretary of _____ ,personally known to me.

_____
NOTARY

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. PROJECT DESCRIPTION

A. The Scope of Work for the construction package is described in Attachment A and the contract drawings and specifications. If a conflict regarding assignment of work exists between the description in Attachment A and the Specifications and/or the Drawings, Attachment A will take precedence.

1.3. CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have use of the building premises as scheduled for construction operations subject to phasing and sequencing requirements, including partial use of the site. The Contractor's use of the premises is limited only by the Owner's and TPM's right to perform construction operations with its own forces or to employ separate contractors on portions of the project. Contractor is cautioned that some work areas are located on existing active school sites and that access may be affected by school operations. Work activities will be sequenced, with approval from TPM, to coincide with the work by others and school operations at existing active school sites. Contractor shall secure approval from Total Program Manager for parking, exterior storage and lay down areas.

1.4. USE OF OWNERS FACILITIES AND PREMISES

A. Contractor and Subcontractors shall be subject to such rules and regulations for the conduct of the work as the Owner or TPM may establish. All employees shall be properly and completely clothed while working. Bare torsos, legs and feet will not be allowed. Possession or consumption of alcoholic beverages or drugs, or other noxious behavior on the site is strictly prohibited. Violators shall be promptly removed from the site.

B. There will be no interaction or communication between the contractor, subcontractors, and their employees with the school administration, staff, teachers or students. Violators shall be promptly removed from the site.

C. Construction related personnel will not be allowed to use the Owners cafeteria, toilet facilities, tools, equipment, pay telephones located inside of the facilities, etc. The Owners premises will be off limits unless a specific work task is to be performed, as directed by the TPM. Violators shall be promptly removed from the site.

D. Construction personnel will not be allowed to loiter, eat lunch, take breaks, gather, etc.

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on the Owners premises outside of the construction boundaries before during or after normal working hours. Violators shall be promptly removed from the site.

E. Before starting the work, the Contractor shall ascertain from the TPM what entrances, routes or roadways shall be used for access to the work, and used only those designated for movement of personnel, materials and vehicles to and from the work. Close coordination will be required of each Contractor and their subcontractors with the Owner, Owners Contractors, TPM and others having an interest in the Project to assure that work on the site, access to and from the site and the general conduct of operations is maintained in a safe and efficient manner, and that disruption and inconvenience to existing streets and property is minimized. Each Contractor is responsible to review the site and be familiar with all existing conditions and requirements.

F. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

G. Contractor shall maintain free access to all buildings and areas of the site for designated vehicles, service vehicles and firefighting equipment and at no time shall block off or close roadways or fire lanes without providing auxiliary roadways and means of entrance acceptable to the TPM. Fire hydrants must remain accessible at all times. Contractor shall give TPM and the local fire department at least (48) hours' notice of any such changes of routes.

H. In some cases, there is no on-site parking for Contractor and Subcontractor employees at sites of existing facilities. Off-site parking for these sites will be designated areas arranged by TPM. Contractor is responsible to provide any necessary transportation to and from the site if required. The Contractor is responsible to maintain the off-site and on-site parking areas and to restore these areas to their original condition. The restoration of damaged items shall be to the satisfaction of the TPM and Owner.

I. Only Contractors vehicles allowed on sites of existing facilities will be delivery and tool related.

J. The Contractor and their Subcontractors shall confine their work to normal working hours; 7:00 A.M. to 5:30 P.M., Monday through Friday. The contractor may work during the entire twenty-four (24) hours of any day of the week with the approval of TPM, providing that they so conduct their operations as to not create a public nuisance or disturb the peace, and provided such work is conducted so as to comply with all applicable laws, ordinances, and regulations.

K. The Contractor must give TPM a written notice at least forty-eight (48) hours in advance whenever they intend to depart from normal work hours. Arrangements will be made for emergency work or shutdowns as may be required with TPM and coordination with the Owner. If the Contractor fails to give the specified notice, they may be required to remove or uncover work performed during such time by TPM.

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L. The Contractor shall be held responsible for all damage to the project including existing facilities, utilities and grounds due to their or their sub-contractors' operations under this contract. The restoration of damaged items shall be to the satisfaction of the TPM and the Owner.

M. Where project involves Contract Work at existing sites or renovation: Maintain the existing building in a weather tight and secure condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

N. The Contractor shall maintain a clean and safe access way in existing areas at all times for the Owners operations and personnel. At some existing sites, the Contractor will have to allow student/teacher access through their construction zone during working hours. Storage inside the building will be permitted if approved in advance by TPM in areas as designated by the Total Program Manager.

O. The Contractor shall effectively confine dust, fumes, dirt, waste and noise to the actual construction areas approved by the TPM. Contractor will clean up on a daily basis.

P. Florida State law mandates that smoking is prohibited on all School Property and/or in School Facilities. Okaloosa County School District regulation prohibits non-school employees to use their designated smoking areas. Smoking is prohibited at any construction site that is adjacent or attached to an existing Facility. Smoking will only be allowed inside of on-site construction trailers in these cases.

1.5. OWNER OCCUPANCY

A. Full Owner Occupancy: The Owner will occupy adjacent buildings during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.

1. Should it be determined by the School Administration that any portion of the work is disruptive to the teaching environment, the Contractor, at no additional cost, will re-schedule the work to off school hours.

B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy.

2. When applicable, obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.

3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed.

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Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

PART 2 - PRODUCTS
(Not applicable).

PART 3 - EXECUTION
(Not applicable)

END OF SECTION 01010

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SECTION 01027

APPLICATIONS FOR PAYMENT

PART 1- GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

B. This Section specifies administrative and procedural requirements governing each prime Contractor's Applications for Payment.

1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule. Schedule of Values must be approved by TPM.

C. The Contractor's Construction Schedule and Submittal Schedule are included in Section "Submittals."

1.3. SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

B. Each Contractor shall coordinate preparation of its Schedule of Values for its part of the Work with preparation of the Contractors' Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

a. Contractor's updated construction schedule with the data correlated to the date on the Application for Payment.
b. Application for Payment form.
c. List of subcontractors.
d. Schedule of alternates.
e. List of Products.
f. List of principal suppliers and fabricators.
g. Schedule of submittals.

2. Submit the Schedule of Values to the TPM at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.

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3. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of work.

C. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Contract application for payment Schedule of Values.

1. Identification: Include the following Project identification on the Schedule of Values

   a. Project name and location
   b. Name of the Architect
   c. Project number
   d. Subcontractor's name and address
   e. Date of submittal

2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:

   a. Generic name
   b. Name of subcontractor
   c. Related Specification Section
   d. Name of manufacturer or fabricator
   e. Name of supplier
   f. Change Orders (numbers) that have affected value
   g. Dollar value
   h. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent

3. Provide a breakdown of the Contract Sum in sufficient detail, such as labor and material breakdown for each item, to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
4. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

   a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in- place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

7. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

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1.4. APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the TPM.

1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment Application Time: A draft Application for Payment shall be submitted by the fifth (5th) day of the month for review by the TPM. On or before the tenth (10th) day of each month after the Contract Work has commenced, Contractor shall submit an executed Application for Payment to TPM for the period ending on the last day of the month which shall indicate the percentage of work completed or material stored at the site for each major segment of work on the Schedule of Values, and the current amounts due therefore. The TPM shall pay Contractor in accordance with the Contract for Construction Services.

C. Payment Application Forms: Use forms acceptable to the TPM as the form for Application for Payment.

D. Application Instructions: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.

1. All Applications for Payment submitted under this AGREEMENT shall reference the legal entity identified in the Contract for Construction Services and be submitted via email to the addresses indicated below. Do not send by regular mail without TPM's prior approval. Forwarded messages, PDF portfolios, ZIP files, and other file formats will not be processed.

Invoice Must Be Emailed To:

Handan Navage@Jacobs.com

With CC's To:

Joel.Lindner@titantechnologies.com
Dustin.Merritt@Jacobs.com

2. A proper invoice must include the following items:

- Name and address of the Contractor.
- Unique invoice number to this Contract and date.
- Contract number for supplies delivered or services performed (including associated line-item number(s)).
- Period for work/services performed.
- Name and address of authorized representative to whom payment is to be sent (must be the same company as stated in the Contract).
- Remit to address and name (where practicable), title, phone number, and email address of person to notify in the event of a defective Application for Payment.
- Releases of Lien in the form stated in the Contract for Construction Services.

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3. Applications for Payment and all supporting documentation must be submitted in one PDF attachment. The Application for Payment should be the first page of the PDF document.
4. Filenames should be Alphanumeric only. NO special characters should be included in the filename.
5. Attachments should be sent directly by email in standard PDF format only.
6. Payment to Contractor will be via electronic payment. Please reference your bank details on your invoice.
7. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
8. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. NOT USED

F. Partial Releases: With each Application for Payment submit releases from all applicable subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.

1. Submit partial releases on each item for the amount requested, prior to deduction for retainage, on each item.
2. The TPM reserves the right to designate which entities involved in the Work must submit releases.
3. Release Forms: Submit releases on forms specified in the Contract for Construction Services, and executed in a manner, acceptable to TPM.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values
4. Contractor's Construction Schedule (preliminary per 01315 or approved).
5. Schedule of principal products.
6. Schedule of unit prices.
7. Submittal Schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits, if any.
11. Copies of authorizations and contractor licenses from governing authorities for performance of the Work.
12. Initial progress report.
13. Report of pre-construction meeting.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire Owner's and/or TPM's insurance.
17. Initial settlement survey and damage report, if required.

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H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Administrative actions and submittals that shall proceed or coincide with this application include:

1. Occupancy permits and similar approvals.
2. Warranties (guarantees) and maintenance agreements.
3. Test/adjust/balance records.
4. Maintenance instructions.
5. Meter readings
6. Start-up performance reports.
7. Change-over information related to Owner's occupancy, use, operation and maintenance.
8. Final cleaning.
9. Application for reduction of retainage, and consent of surety.
10. Advice on shifting insurance coverages.
11. Final progress photographs.
12. List of incomplete Work recognized as exceptions to Owner's/Architect's Certificate of Substantial Completion.

J. Final Payment Application: Administrative actions and submittals which must precede the with submittal of the Final Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Resolution of all claims.
4. Satisfactory completion of all punch list work.
5. Transmittal of required Project construction records to Owner.
6. Certified property survey (if required).
7. Proof that taxes, fees and similar obligations have been paid.
8. Removal of temporary facilities and services.
9. Removal of surplus materials, rubbish and similar elements.
10. Change of door locks to Owner's access (where applicable).
11. Written Consent of Surety to Final Payment.
12. Properly executed Final Releases.

K. The payment process outlined within this Attachment shall take precedence over any other conflicting condition or payment term referenced in this Contract or shown elsewhere.

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PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 01027

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SECTION 01030

ALTERNATES

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements for Alternates.

B. Definition: An Alternate is an amount bid by Contractors and accepted by the TPM for certain construction activities defined in the Contract Documents that may be added to or deducted from Base Contract Price if the TPM decides to accept the Alternate.

C. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.

D. Notification: Following the award of the Contract, the Total Program Manager will prepare and distribute to each party involved, notification of the status of each Alternate. The TPM will indicate whether each Alternate has been accepted, rejected or deferred for consideration at a later date. Included will be a complete description of any negotiated modifications to Alternates.

E. Schedule: A list of Alternates is included as part of the Contract. Specification Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the Work described under each Alternate.

1. 1. Include as part of each Alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether mentioned as part of the Alternate.

1.3. ALTERNATE SCHEDULE

A. Alternates are listed in Specification Section 00300 Bid Proposal Form.

PART 2 – PRODUCTS
(Not Applicable)

PART 3 – EXECUTION
(Not Applicable)

END OF SECTION 01030

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SECTION 01035

MODIFICATION PROCEDURES

PART 1- GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 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: The following sections contain requirements that relate to this section:

1. Division 1 Section "Submittal" for requirements for the Contractor's Construction Schedule.

2. Division 1 Section "Application for Payment" for administrative procedures governing applications for payment.

3. Division 1 Section "Product Substitutions" for administrative procedures for handling requests for substitutions made after award of the Contract.

1.3. MINOR CHANGES IN THE WORK

A. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Price or Contract Time, may be issued by the TPM.

B. Should Contractor not agree with TPM about minor change effecting Contract Price or Contract Time, Contractor must submit written notice to TPM within seven (7) days of supplemental instructions being issued or waive all rights for future adjustment to Contract Sum or Contract Time.

1.4. CHANGE ORDER PROPOSAL REQUESTS

A. Total Program Manager-Initiated Proposal Requests: Proposed changes in the Work that will require adjustment to the Contract Price or Contract Time will be issued by the TPM, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.

1. Proposal requests issued by the TPM are for information only. They shall not be considered as instruction to either to stop work in progress or execute the proposed change.

2. Unless otherwise indicated in the proposal request, within 10 days of receipt of the proposal request, submit to the TPM for review an estimate of cost necessary to execute the proposed change. If the Contractor does not respond within ten (10) days

TPM can establish the cost of the proposal request.

a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

b. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

c. Indicate separate breakout for 10% markup for overhead and profit applied to all labor performed by Contractor with its own forces and 5% markup for all other costs except taxes, insurance and bonding which shall bear no markup.

B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Total Program Manager.

1. Include a statement outlining the 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 Price and Contract Time and why Contractor is entitled to such adjustment.

2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Comply with requirements in Section "Product Substitutions" if the proposed change in the Work requires the substitution of one product or system for a product or system specified.

1.5. CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the TPM and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the TPM may issue a written Field Work Directive, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Field Work Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time.

B. Documentation: Maintain detailed time and material records for any Field Work Directive received by the Contractor when the Contract Price or Contract Time adjustment has not been agreed upon prior to the start of the respective work.

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

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1.6. CHANGE ORDER PROCEDURES

A. Upon the TPM's approval of a Change Order Proposal Request, the TPM will issue a Change Order for signatures as provided in the Contract Documents.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 01035

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SECTION 01040

PROJECT COORDINATION

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:

1. Coordination
2. Administrative and supervisory personnel
3. General installation provisions
4. Cleaning and protection

B. Field engineering is included in Section "Field Engineering".

C. Progress meetings, coordination meetings and pre-installation conferences are included in Section "Project Meetings".

D. Requirements for the Contractor's Construction Schedule are included in Sections "Submittals" and “Schedules and Reports”.

1.3. COORDINATION

A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.

2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Total Program Manager and separate Contractors where coordination of their Work is required.

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C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules
2. Installation and removal of temporary facilities
3. Delivery and processing of submittal
4. Progress meetings
5. Project Close-out activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1.4. SUBMITTAL

A. Coordination Drawings: Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.

1. Show the interrelationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section "Submittals".

B. Staff Names: Within 15 days of Notice of Award, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; and list their telephone numbers.

PART 2 – PRODUCTS
(Not Applicable)

PART 3 – EXECUTION

3.1. - GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement. All attachments, connections and supports shall meet the applicable code requirements.

E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect and

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Total Program Manager for final decision.

F. Recheck measurements and dimensions, before starting each installation.

G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated, submit RFI to TPM for final decision.

3.2. CLEANING AND PROTECTION

A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading
2. Excessive internal or external pressures
3. Excessively high or low temperatures
4. Thermal shock
5. Excessively high or low humidity
6. Air contamination or pollution
7. Water or ice
8. Solvents
9. Chemicals
10. Light
11. Radiation
12. Puncture
13. Abrasion
14. Heavy traffic
15. Soiling, staining and corrosion
16. Bacteria
17. Rodent and insect infestation
18. Combustion
19. Electrical current
20. High speed operation
21. Improper lubrication

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22. Unusual wear or other misuse
23. Contact between incompatible materials
24. Destructive testing
25. Misalignment
26. Excessive weathering
27. Unprotected storage
28. Improper shipping or handling
29. Theft
30. Vandalism

END OF SECTION 01040

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SECTION 01045

CUTTING AND PATCHING

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements for cutting and patching.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1. Requirements of this Section also apply to mechanical and electrical installations. Refer to Division 15 and Division 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

C. Demolition of selected portions of the building, if any, for alterations is included in Section "Demolition."

1.3. SUBMITTALS

A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
3. List products to be used and firms or entities that will perform Work.
4. Indicate dates when cutting and patching is to be performed.
5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by the TPM to proceed with cutting and patching does not waive the TPM's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

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1.4. QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following elements:

a. Foundation construction.
b. Bearing and retaining walls.
c. Structural concrete.
d. Structural steel.
e. Lintels.
f. Timber and primary wood framing.
g. Structural decking.
h. Stair systems.
i. Miscellaneous structural metals.
j. Exterior curtain wall construction.
k. Equipment supports.
l. Piping, ductwork, vessels and equipment

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

a. Shoring, bracing, and sheeting.
b. Primary operational systems and equipment.
c. Air or smoke barriers.
d. Water, moisture, or vapor barriers.
e. Membranes and flashings.
f. Fire protection systems.
g. Noise and vibration control elements and systems.
h. Control systems.
i. Communication systems.
j. Conveying systems.
k. Electrical wiring systems.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the TPM’s opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1. If possible, retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

a. Processed concrete finishes.
b. Stonework and masonry.
c. Aggregate wall coating.

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PART 2 - PRODUCTS

2.1. MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1. INSPECTION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2. PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations. Ensure workers are wearing proper protective equipment and the area is protected from unauthorized personnel. Protect workers doing the work and other workers that are affected by the work.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3. PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
4. Comply with requirements of applicable Sections of Division 2 where cutting and patching requires excavating and backfilling.
5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
6. To the extent possible, minimize airborne debris from effecting HVAC, light fixtures, fire alarms and other sensors.
7. Ensure fire extinguishers are nearby in the event of fire hazards when cutting and patching.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
4. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken area containing the patch, after the patched area has received primer and second coat.
5. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

1.1 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely dust, paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

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SECTION 01050

FIELD ENGINEERING

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. General: This Section specifies administrative and procedural requirements for field engineering services, including, but not necessarily limited to, the following:

1. Verification of existing conditions
2. Interior layout

1.3. SUBMITTALS

A. For projects including building demolition, prior to starting work on any floor, submit a project record plan of the existing floor layout which reflects the existing conditions upon completion of the demolition. The TPM will provide reproducible background drawings for recording the information. The submitted drawings will remain on file in the TPM's field office for reference by all Subcontractors.

1.4. QUALITY ASSURANCE

A. Layout: Contractor shall be responsible for laying out Contractor’s Work, shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of TPM. Contractor shall report to TPM whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations and shall be responsible for the accurate replacement or relocation of such reference points. Contractor's Work shall be executed in accordance with the locations, lines and grades specified or shown on the drawings, subject to such modifications as TPM may require.

B. Surveyor: Engage a properly licensed surveyor knowledgeable of interior layout to perform the project record survey.

PART 2 – PRODUCTS
(Not Applicable)

PART 3 - EXECUTION

3.1. EXAMINATION

A. Confirm existing conditions shown on the Drawings before proceeding to layout the Work.

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B. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction.

1. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.

END OF SECTION 01050

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SECTION 01095

REFERENCE STANDARDS AND DEFINITIONS

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. DEFINITIONS

A. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

B. Directed: Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Total Program Manager, requested

C. Approved: The term approved, when used in conjunction with the Total Program Manager's action on the Contractor's submittals, applications, and requests, is limited to the Total Program Manager's duties and responsibilities as stated in the Contract.

D. Regulations: The term regulations, includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

E. Furnish: The term furnish means purchase, transport and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

F. Install: The term install means receive, unload, inventory, store, unpack, transport and position into final dimensioned location, assemble, erect, place, anchor, apply, finish, cure, protect, clean, startup and place in operation. Install shall include providing all applicable accessories, appurtenances, valves, disconnects, fittings, drains, traps, tailpieces, strainers, etc. to provide a complete and serviceable installation.

G. Provide: The term provide means to furnish and install, complete and ready for the intended use.

H. Installer: An Installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term experienced, when used with the term Installer, means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

2. Trades: Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a

corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no choice or option. However, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

    a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

I. Project site is the space available to the Contractor for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

J. Testing Agencies: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3. SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 1-33 Division format and MASTERFORMAT numbering system.

B. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

    a. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

1.4. INDUSTRY STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

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B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents, unless stated otherwise by code.

C. Conflicting Requirements: Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and other uncertainties to the TPM for a decision before proceeding.

1. 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 the requirements. Refer uncertainties to the Total Program Manager for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the Text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

F. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but not ensured, to be accurate and up to date as of the date of Contract Documents.

AA	Aluminum Association 900 19th St., NW, Suite 300 Washington, DC 20006	(202) 862-5100
AABC	Associated Air Balance Council 1518 K St., NW Washington, DC 20005	(202) 737-0202
AAMA	American Architectural Manufacturers Assoc. 1540 E. Dundee Road, Suite 310 Palatine, IL 60067	(708) 202-1350
AAN	American Association of Nurserymen 1250 Eye St., NW, Suite 500 Washington, DC 20005	(202) 789-2900
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol St., Suite 225 Washington, DC 20001	(202) 624-5800

AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 Research Triangle Park, NC	(919) 549-8141
ACI	American Concrete Institute P.O. Box 19150 Detroit, MI 48219	(313) 532-2600
ACIL	American Council of Independent Laboratories 1629 K St., NW Washington, DC 20006	(202) 887-5872
ACPA	American Concrete Pipe Assoc. 8300 Boone Blvd., Suite 400 Vienna, VA 22182	(703) 821-1990
ADC	Air Diffusion Council One Illinois Center, Suite 200 111 East Wacker Drive Chicago, IL 60601-4298	(312) 616-0800
AFBMA	Anti-Friction Bearing Manufacturers Assoc. 1101 Connecticut Ave., NW, Suite 700 Washington, DC 20036	(202) 429-5155
AGA	American Gas Assoc. 1515 Wilson Blvd. Arlington, VA 22209	(703) 841-8400
AHA	American Hardboard Assoc. 520 N. Hicks Road Palatine, IL 60067	(708) 934-8800
AHAM	Association of Home Appliance Manufacturers 20 N. Wacker Drive Chicago, IL 60606	(312) 984-5800
AI	Asphalt Institute Research Park Drive P.O. Box 14052 Lexington, KY 40512-4052	(606) 288-4960
AIA	American Institute of Architects 1735 New York Ave., NW Washington, DC 20006	(202) 626-7300
AIA	American Insurance Assoc. 1130 Connecticut Ave., NW, Suite 1000 Washington, DC 20036	(202) 828-7100
AIHA	American Industrial Hygiene Assoc. P.O. Box 8390 345 White Pond Dr. Akron, OH 44320	(216) 873-2442

AISC	American Institute of Steel Construction One East Wacker Drive, Suite 3100 Chicago, IL 60601-2001	(312) 670-2400
AISI	American Iron and Steel Institute 1101 17th Street, NW, Suite 1300 Washington, DC 20036-4700	(202) 463-6573
AITC	American Institute of Timber Construction 11818 SE Mill Plain Blvd., Suite 415 Vancouver, WA 98684	(206) 254-9132
ALCA	Associated Landscape Contractors of America 12200 Sunrise Valley Drive, Suite 150 Reston, VA 22091	(703) 620-6363
ALI	Associated Laboratories, Inc. 500 S. Vermont St. Palatine, IL 60067	(708) 358-7400
ALSC	American Lumber Standards Committee P.O. Box 210 Germantown, MD 20875	(301) 972-1700
AMCA	Air Movement and Control Assoc. 30 W. University Drive Arlington Heights, IL 60004-1893	(708) 394-0150
ANSI	American National Standards Institute 11 West 42nd Street, 13th Floor New York, NY 10036	(212) 642-4900
AOAC	Association of Official Analytical Chemists 2200 Wilson Blvd., Suite 400 Arlington, VA 22201-3301	(703) 522-3032
AOSA	Association of Official Seed Analysts c/o Larry J. Prentice 268 Plant Science 1ANR-UNL, Box 19281 Lincoln, NE 68583-0911	(402) 472-8649
APA	American Plywood Assoc. P.O. Box 11700 Tacoma, WA 98411	(206) 565-6600
API	American Petroleum Institute 1220 L St., NW Washington, DC 20005	(202) 682-8000
ARI	Air Conditioning and Refrigeration Institute 1501 Wilson Blvd., 6th Floor Arlington, VA 22209	703) 524-8800
ARMA	Asphalt Roofing Manufacturers Assoc. 6288 Montrose Rd. Rockville, MD 20852	(301) 231-9050

ASA	Acoustical Society of America 500 Sunnyside Blvd. Woodbury, NY 11797	(516) 349-7800
ASC	Adhesive and Sealant Council 1627 K Street, NW, Suite 1000 Washington, DC 20006-1707	(202) 452-1500
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329	(404) 636-8400
ASME	American Society of Mechanical Engineers 345 East 47th St. New York, NY 10017	(212) 705-7722
ASPE	American Society of Plumbing Engineers 3617 Thousand Oaks Blvd., Suite 210 Westlake, CA 91362	(805) 495-7120
ASSE	American Society of Sanitary Engineering P.O. Box 40362 Bay Village, OH 44140	(216) 835-3040
ASTM	American Society for Testing and Materials 1916 Race St. Philadelphia, PA 19103-1187	(215) 977-9679
AWCMA	American Window Covering Manufacturers Assoc. 355 Lexington Ave. New York, NY 10017	(404) 636-8400
AWI	Architectural Woodwork Institute P.O. Box 1550 13924 Braddock Rd., Suite 100 Centreville, VA 22020	(703) 222-1100
AWPA	American Wood-Preservers' Assoc. 4128-1/2 California Ave. SW, No. 171 Seattle, WA 98116	(206) 937-5338
AWPB	American Wood Preservers Bureau 4 E. Washington St. Newnan, GA 30263	(404) 254-9877
AWS	American Welding Society 550 LeJeune Road, NW P.O. Box 351040 Miami, FL 33135	(305) 443-9353
AWWA	American Water Works Assoc. 6666 W. Quincy Ave. Denver, CO 80235	(303) 794-7711

BANC	Brick Association of North Carolina P.O. Box 13290 Greensboro, NC 27415-3290	(919) 273-5566
BHMA	Builders' Hardware Manufacturers Assoc. 355 Lexington Ave., 17th Floor New York, NY 10017	(212) 661-4261
BIA	Brick Institute of America 11490 Commerce Park Drive Reston, VA 22091	(703) 620-0010
BIFMA	Business and Institutional Furniture Manufacturer's Assoc. 2335 Burton St., SE Grand Rapids, MI 49506	(616) 243-1681
CAGI	Compressed Air and Gas Institute c/o John H. Addington Thomas Associates, Inc. 1300 Sumner Ave. Cleveland, OH 44115-2851	(216) 241-7333
CAUS	Color Association of the United States 409 W. 44th Street New York, NY 10036	(212) 582-6884
CBM	Certified Ballast Manufacturers Assoc. Hanna Building, No. 772 1422 Euclid Ave. Cleveland, OH 44115-2851	(216) 241-0711
CCC	Carpet Cushion Council P.O. Box 546 Riverside, CT 06878	(203) 637-1312
CDA	Copper Development Assoc. 2 Greenwich Office Park, Box 1840 Greenwich, CT 06836	(203) 625-8210
CFFA	Chemical Fabrics & Film Association, Inc. c/o Thomas Associates, Inc. 1300 Sumner Ave. Cleveland, OH 44115-2851	(216) 241-7333
CGA	Compressed Gas Assoc. 1725 Jefferson Davis Highway, Suite 1004 Arlington, VA 22202-4100	(703) 979-0900
CISCA	Ceiling and Interior Systems Construction Assoc. 5700 Old Orchard Road, 1st Floor Skokie, IL 60077	(708) 965-2776
CISPI	Cast Iron Soil Pipe Institute 5959 Shallowford Road, Suite 419 Chattanooga, TN 37421	(615) 892-0137

CRI	Carpet and Rug Institute P.O. Box 2048 Dalton, GA 30722	(404) 278-3176
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Rd. Schaumburg, IL 60173	(708) 517-1200
CTI	Ceramic Tile Institute of America 700 N. Virgil Ave. Los Angeles, CA 90029	(213) 660-1911
DHI	Door and Hardware Institute 14170 New Brook Drive Chantilly, VA 22022	(703) 222-2010
DLPA	Decorative Laminate Products Assoc. 600 S. Federal St., Suite 400 Chicago, IL 60605	(312) 922-6222
ECSA	Exchange Carriers Standards Assoc. 5430 Grosvenor Lane, Suite 200 Bethesda, MD 20814	(301) 564-4505
EIA	Electronic Industries Assoc. 2001 Pennsylvania Ave., NW Washington, DC 20006-1813	(202) 457-4900
EIMA	Exterior Insulation Manufacturers Assoc. 2759 State Road 580, Suite 112 Clearwater, FL 34621	(813) 726-6477
EJMA	Expansion Joint Manufacturers Assoc. 25 N. Broadway Tarrytown, NY 10591	(914) 332-0040
ETL	ETL Testing Laboratories, Inc. P.O. Box 2040, Route 11, Industrial Park Cortland, NY 13045	(607) 753-6711
FCI	Fluid Controls Institute P.O. Box 9036 Morristown, NJ 07960	(201) 829-0990
FGMA	Flat Glass Marketing Assoc. White Lakes Professional Bldg. 3310 S.W. Harrison Topeka, KS 66611-2279	(913) 266-7013
FM	Factory Mutual Research Organization 1151 Boston-Providence Turnpike P.O. Box 9102 Norwood, MA 02062	(617) 762-4300

FTI	Facing Tile Institute P.O. Box 8880 Canton, OH 44711	(216) 488-1211
GA	Gypsum Association 810 First Street, NE, Suite 510 Washington, DC 20002	(202) 289-5440
HEI	Heat Exchange Institute c/o John H. Addington Thomas Associates, Inc. 1300 Sumner Ave. Cleveland, OH 44115-2851	(216) 241-7333
HI	Hydronics Institute P.O. Box 218 35 Russo Place Berkeley Heights, NJ 07922	(908) 464-8200
HI	Hydraulic Institute 30200 Detroit Road Cleveland, OH 44145-1967	(216) 899-0010
HMA	Hardwood Manufacturers Assoc. 400 Penn Center Blvd. Pittsburgh, PA 15235	(412) 829-0770
HPMA	Hardwood Plywood Manufacturers Assoc. 1825 Michael Farraday Drive P.O. Box 2789 Reston, VA 22090-2789	(703) 435-2900
IBD	Institute of Business Designers 341 Merchandise Mart Chicago, IL 60654	(312) 647-1950
ICEA	Insulated Cable Engineers Association, Inc. P.O. Box 440 South Yarmouth, MA 02664	(508) 394-4424
IEC	International Electrotechnical Commission (Available from ANSI) 1430 Broadway New York, NY 10018	(212) 354-3300
IEEE	Institute of Electrical and Electronic Engineers 345 E. 47th St. New York, NY 10017	(212) 705-7900
IESNA	Illuminating Engineering Society of North America 345 E. 47th St. New York, NY 10017	(212) 705-7926

IGCC	Insulating Glass Certification Council c/o ETL Testing Laboratories, Inc. P.O. Box 2040 Route 11, Industrial Park Cortland, NY 13045	(607) 753-6711
ILI	Indiana Limestone Institute of America Stone City Bank Building, Suite 400 Bedford, IN 47421	(703) 435-2900
IMSA	International Municipal Signal Assoc. 165 E. Union St. P.O. Box 539 Newark, NY 14513	(315) 331-2182
IRI	Indiana Limestone Institute of America Stone City Bank Building, Suite 400 Bedford, IN 47421	(703) 435-2900
ISA	International Municipal Signal Assoc. 165 E. Union St. P.O. Box 539 Newark, NY 14513	(315) 331-2182
KCMA	Insulated Cable Engineers Association, Inc. P.O. Box 440 South Yarmouth, MA 02664	(508) 394-4424
LIA	Lead Industries Association, Inc. 295 Madison Avenue New York, NY 10017	(212) 354-3300
LPI	Lightning Protection Institute 3365 North Arlington Heights Rd., Suite J Arlington Heights, IL 60004	(708) 255-3003
MBMA	Metal Building Manufacturer's Assoc. c/o Charles M. Stockinger Thomas Associates, Inc. 1300 Sumner Ave. Cleveland, OH 44115-2851	(216) 241-7333
MCAA	Mechanical Contractors Association of America 1385 Piccard Dr. Rockville, MD 20850-4329	(301) 869-5800
MFMA	Maple Flooring Manufacturers' Assoc. 60 Revere Dr., Suite 500 Northbrook, IL 60062	(708) 480-9138
MIA	Marble Institute of America 33505 State St. Farmington, MI 48335	(313) 476-5558

ML/SFA	Metal Lath/Steel Framing Assoc. (A Division of the National Association of Architectural Metal Manufacturers) 600 S. Federal St., Suite 400 Chicago, IL 60605	(312) 922-6222
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park St., NE Vienna, VA 22180	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers 600 S. Federal St., Suite 400 Chicago, IL 60605	(312) 922-6222
NAIMA	North American Insulation Manufacturers Assoc. 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314	(703) 684-0084
NAPA	National Asphalt Pavement Assoc. NAPA Building 5100 Forbes Blvd. Lanham, MD 20706-4413	(301) 731-4748
NAPF	National Association of Plastic Fabricators (Now DLPA)	
NBGQA	National Building Granite Quarries Assoc. P.O. Box 482 Barre, VT 05641	(802) 476-3115
NBHA	National Builder's Hardware Assoc. (Now DHI)	
NCMA	National Concrete Masonry Assoc. P.O. Box 781 Herndon, VA 22070-0781	(703) 435-4900
NCRPM	National Council on Radiation Protection and Measurements 7910 Woodmont Ave., Suite 800 Bethesda, MD 20814	(301) 657-2652
NCSPA	National Corrugated Steel Pipe Association 2011 Eye Street, NW Washington, DC 20006	(202) 223-2217
NEC	National Electrical Code (from NFPA)	
NECA	National Electrical Contractors Assoc. 7315 Wisconsin Ave. Bethesda, MD 20814	(301) 657-3110
NEII	National Elevator Industry, Inc. 185 Bridge Plaza, North Fort Lee, NJ 07024	(201) 944-3211

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NEMA	National Electrical Manufacturers Assoc. 2101 L St., NW, Suite 300 Washington, DC 20037	(202) 457-8400
NETA	International Electrical Testing Assoc. P.O. Box 687 Morrison, CO 80465	(303) 467-0526
NFPA	National Fire Protection Assoc. One Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101	(617) 770-3000
NFPA	National Forest Products Assoc. 1250 Connecticut Ave., NW, Suite 200 Washington, DC 20036	(800) 344-3555
NHLA	National Hardwood Lumber Assoc. P.O. Box 34518 Memphis, TN 38184-0518	(202) 463-2700
NKCA	National Kitchen Cabinet Assoc. (Now KCMA)	
NLGA	National Lumber Grades Authority 1055 W. Hastings St., Suite 260 Vancouver, British Columbia Canada V6E 2E9	(604) 687-2171
NOFMA	National Oak Flooring Manufacturers Assoc. P.O. Box 3009 Memphis, TN 38173-0009	(901) 526-5016
NPA	National Particleboard Assoc. 18928 Premiere Court Gaithersburg, MD 20879	(301) 670-0604
NPCA	National Paint and Coatings Assoc. 1500 Rhode Island Ave., NW Washington, DC 20005	(202) 462-6272
NRCA	National Roofing Contractors Assoc. 10255 W. Higgins Rd., Suite 600 Rosemont, IL 60018-5607	(708) 299-9070
NSF	National Sanitation Foundation 3475 Plymouth Rd. P.O. Box 1468 Ann Arbor, MI 48106	(313) 769-8010
NSSEA	National School Supply and Equipment Assoc. 8300 Colesville Rd., No. 250 Silver Spring, MD 20910	(301) 495-0240
NTMA	National Terrazzo and Mosaic Assoc. 3166 Des Plaines Ave., Suite 132 Des Plaines, IL 60018	(708) 635-7744

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NWMA	National Woodwork Manufacturers Assoc. (Now NWWDA)	
NWWDA	National Wood Window and Door Assoc. 1400 E. Touhy Ave., #G54 Des Plaines, IL 60018	(708) 299-5200 (800) 223-2301
PCA	Portland Cement Assoc. 5420 Old Orchard Road Skokie, IL 60077	(708) 966-6200
PCI	Precast/Prestressed Concrete Institute 175 W. Jackson Blvd. Chicago, IL 60604	(312) 786-0300
PDI	Precast/Prestressed Concrete Institute 175 W. Jackson Blvd. Chicago, IL 60604	(317) 251-6970
PEI	Porcelain Enamel Institute 1101 Connecticut Ave., NW, Suite 700 Washington, DC 20036	(202) 857-1134
RFCI	Resilient Floor Covering Institute 966 Hungerford Drive, Suite 12-B Rockville, MD 20805	(301) 340-8580
RIS	Redwood Inspection Service 405 Enfrente Drive, Suite 200 Novato, CA 94949	(415) 382-0662
RMA	Rubber Manufacturers Assoc. 1400 K St., NW Washington DC 20005	(202) 682-4800
SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711	(216) 493-7886
SDI	Steel Door Institute 30200 Detroit Road Cleveland, OH 44145	(216) 889-0010
SGCC	Safety Glazing Certification Council c/o ETL Testing Laboratories Route 11, Industrial Park Cortland, NY 13045	(607) 753-6711
SHLMA	Southern Hardwood Lumber Manufacturer's Assoc. (Now HMA)	
SIGMA	Sealed Insulating Glass Manufacturer's Assoc. 401 N. Michigan Chicago, IL 60611	(312) 644-6610

SJI	Steel Joist Institute 1205 48th Avenue North, Suite A Myrtle Beach, SC 29577	(803) 449-0487
SMA	Screen Manufacturer's Assoc. 3950 Lake Shore Drive, Suite 502-A Chicago, IL 60613-3431	(312) 525-2644
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association 4201 Lafayette Center Drive Chantilly, VA 22021	(703) 803-2980
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway Pensacola, FL 32504	(904) 434-2611
SPRI	Single Ply Roofing Institute 20 Walnut St. Wellesley Hills, MA 02189	(617) 237-7879
SSPC	Steel Structures Painting Council 4400 Fifth Ave. Pittsburgh, PA 15213-2683	(412) 268-3327
SSPMA	Sump and Sewage Pump Manufacturer's Assoc PO Box 298 Winnetka, IL 60093	(708) 835-8911
SWI	Steel Window Institute c/o Thomas Associates, Inc. 1300 Sumner Ave, Cleveland, OH 44115-2851	(216) 241-7333
SWPA	Submersible Wastewater Pump Assoc. 600 S. Federal Street, Suite 400 Chicago, IL 60605	(312) 922-6222
TCA	Tile Council of America P.O. Box 326 Princeton, NJ 08542	(609) 921-7050
TIMA	Thermal Insulation Manufacturer's Assoc. 29 Bank Street Stanford, CT 06901 (Standards now issued by NAIMA)	(203) 324-7533
TPI	Truss Plate Institute 583 D'Onofrio Drive, Suite 200 Madison, WI 53719	(608) 833-5900
UFAC	Upholstered Furniture Action Council Box 2436 High Point, NC 27261	(919) 885-5065

UL	Underwriters Laboratories, Inc. 333 Pfingsten Rd. Northbrook, IL 60062	(708) 272-8800
USP	U.S. Pharmacopoeia Convention 12601 Twinbrook Parkway Rockville, MD 20852	(301) 881-0666
WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97223	(503) 639-0651
WCMA	Wallcovering Manufacturers Assoc. 355 Lexington Ave., 17th Floor New York, NY 10017 (WCMA has moved from this location, perhaps to the Chicago area. Address and telephone number not confirmed.)	(212) 661-4261
WIC	Woodwork Institute of California P.O. Box 11428 Fresno, CA 93773-1428	(209) 233-9035
WRI	Wire Reinforcement Institute 11101 Connecticut Ave. NW, Suite 700 Washington, DC 20036-4303	(202) 429-5125
WSC	Water Systems Council 600 S. Federal St., Suite 400 Chicago, IL 60605	(312) 922-6222
WSFI	Wood and Synthetic Flooring Institute 4415 W. Harrison St., Suite 242-C Hillside, IL 60162	(708) 449-2933
WLPDIA	Western Lath, Plaster, Drywall Industries Assoc. (Formerly California Lath & Plaster Assoc.) 8635 Navaho Road San Diego, CA 92119	(619) 466-9070
WWPA	Western Wood Products Assoc Yeon Building 522 SW 5th Avenue Portland, OR 97204-2122	(503) 224-3930
WWPA	Woven Wire Products Assoc. 2515 N. Nordica Ave. Chicago, IL 60635	(312) 637-1359

Federal Government Agencies

G Names and titles of federal government Standard- or Specification producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of Standard- or Specification-producing agencies of the federal government. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of the date of the Contract Documents.

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CE	Corps of Engineers U.S. Department of the Army Chief of Engineers – Referral Washington, DC 20314	(202) 272-0660
CFR	Code of Federal Regulations (Available from Government Printing Office) N. Capitol Street, Between G and H St., NW Washington, DC 20402 Material is usually published in the “Federal Register”	(202) 783-3238
CPSC	Consumer Product Safety Commission 5401 Westbard Ave. Bethesda, MD 20207	(301) 492-6580 (800) 638-2772
CS	Commercial Standard (U.S. Department of Commerce) Washington, DC 20230	(202) 482-2000
DOC	U.S. Department of Commerce 14th St. and Constitution Ave., NW Washington, DC 20230	(202) 482-2000
DOT	Department of Transportation 400 Seventh St., SW Washington, DC 20590	(202) 366-4000
EPA	Environmental Protection Agency 401 M St., SW Washington, DC 20460	(202) 382-2090
FAA	Federal Aviation Administration (U.S. Department of Transportation) 800 Independence Ave., SW Washington, DC 20590	(202) 366-4000
FCC	Federal Communications Commission 1919 M St., NW Washington, DC 20554	(202) 632-7000
FHA	Federal Housing Administration (U.S. Department of Housing and Urban Development) Director, Manufactured Housing and Construction Standards Division 451 Seventh St., SW, Room 9158 Washington, DC 20201	(202) 755-5210
FS	Federal Specifications (from GSA) Specifications Unit (WFSIS) 7th and D St., SW Washington, DC 20407	(202) 708-9205
GSA	General Services Administration F St. and 18th St., NW Washington, DC 20405	(202) 708-5082

MIL	Military Standardized Documents (U.S. Department of Defense) Naval Publications and Forms Center 5801 Tabor Ave. Philadelphia, PA 19120	
NIST	National Institute of Standards and Technology (U.S. Department of Commerce) Gaithersburg, MD 20899	(301) 975-2000
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) N3647 200 Constitution Ave., NW Washington, DC 2020	(202) 219-8148
PS	Product Standards of NBS (U.S. Department of Commerce) Washington, DC 20230	(202) 482-2000
REA	Rural Electrification Administration (U.S. Department of Agriculture) 14th St. and Independence Ave., SW Washington, DC 20250	(202) 447-2791
USDA	U.S. Department of Agriculture 14th St. and Independence Ave., SW Washington, DC 20250	(202) 447-2791

1.5. GOVERNING REGULATIONS AND AUTHORITIES

A. Copies of Regulations: Obtain copies of the Codes of Record which apply to the Project and retain at the Project site to be available for reference by parties who have a reasonable need.

1.6. SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 01095

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SECTION 01100

SPECIAL PROJECT PROCEDURES

PART 1 – GENERAL

1.1. PROVISIONS INCLUDED

A. Drawings, the Contract for Construction Services and other Sections of Division 0 and Division 1 apply to the work under this Section.

1.2. PUBLISHED REGULATIONS

A. The Contractor shall at all times abide by the published ordinance, regulations, laws, rules and orders, etc. of the public authorities bearing on performance of the Contract work and all amendments, including those that may be issued during the duration of the Contract. Particular attention is called to those regulations pertaining to circulation, noise, sanitation, safety and behavior.

1.3. OUTAGES

A. When required during any occupancy of the buildings by the Owner, utility and service outages shall be kept to a minimum and will be permitted only with written advance approval of the Owner and/or TPM. Outages that will, in the opinion of the Owner and/or the TPM, severely affect building occupants must be completed during off- hours or on weekends or holidays at no additional cost to the Owner or TPM.

B. Contractor shall give sufficient advance notice to the TPM to permit TPM to make necessary arrangements with those affected. All requests for outages shall be made in writing to the TPM a minimum of seven (7) calendar days in advance of the interruption in service.

C. Necessary utility and service outages affecting off-site properties and persons shall be arranged with the related utilities and public authorities as the sole expense of the Contractor.

D. Requests for outages will not be considered unless they include an identification of all areas which will be affected by the proposed outage.

E. Contractor shall be responsible for all costs of the Owner and TPM arising from outages occurring without approval of the TPM, including accidental outages.

1.4. MAINTENANCE OF BUILDING SECURITY

A. The Contractor shall make every effort to maintain the security of existing building. The Contractor shall cooperate with the Owner and TPM in particularly sensitive areas where security and special safeguards are required. Contractor shall be responsible for all costs of the Owner and TPM arising from any loss due to the Contractor's failure to maintain the security of existing facilities.

B. Should the Contractor's or its Subcontractors' operations cause a breach in the building security, the Contractor shall supply, at its expense twenty-four-hour (24hr.) security

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personnel until the building security is re-established.

1.5. PROTECTIVE NIGHT LIGHTING

A. The Contractor shall provide adequate outdoor lighting to illuminate security zones, staging, stockpiles, trenches, projections, and the like, with the intent of protecting the materials and construction from vandalism, theft, and to protect the public from injury and property damage. Such lighting shall be in addition to temporary power and lighting required under the Temporary Facilities Section. Cost for installing protective night lighting and the power for their operation shall be included in the Contractor's contract price for the work.

1.6. PUMPING AND DRAINING

A. The Contractor shall take over the responsibility for site drainage in areas under its control upon entering the premises and shall maintain such drainage during the life of the Contract as approved by the TPM, and so as not to adversely affect the adjacent areas.

B. Legally remove by pumping, draining or bailing any water which may accumulate or be found on the site within the contract limits where excavating and grading are to be done, whether from snow, rain, surface flow, springs, ground water, backing-up of drains or sewers, or from any other cause, always, and under any circumstances and contingencies that may arise. Form all pump wells, sumps, dams, flumes or other necessary works to keep trenches and excavations entirely clear of water. The Contractor shall have at all times upon the site, sufficient and satisfactory pumping machinery. Pump wells or well points and underdrains as may be required, shall be provided where needed to properly handle the water.

C. Water from trenches and excavations shall be disposed of in accordance with applicable law so as to not cause injury to public health nor to public or private property, nor to the existing work or to the work completed or in progress, nor to the surfaces of roads, walks, and streets, nor cause any interference with the use of the same by public.

D. Newly made and existing concrete and masonry shall be protected from injury resulting from dewatering work by protective coverings.

1.7. BROKEN GLASS

A. The Contractor shall be responsible for all broken, cracked, and/or scratched glass (new and existing) damaged during the construction period and shall replace all such defective glass before final acceptance. TPM may direct Contractor to have glass replaced immediately in instances of safety or protection.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 01100

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SECTION 01120

ALTERATIONS TO EXISTING CONSTRUCTION

PART 1 - GENERAL

1.1. PROVISIONS INCLUDED

A. Drawings, the provisions of Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. ALTERATIONS

A. This Section describes coordination between the demolition, stabilization and restoration, and finishes of the work of this Contract.

B. Cutting, fitting and patching of all existing and new construction as required for the work of trades is specifically required to be performed by the Contractor, or subcontractor(s) selected by the Contractor as most appropriately responsible for the material or assembly to be altered, as required for the proper execution of the work of all trades.

C. Preparation of existing surfaces to receive finishes to be applied under various Sections of the Specification is described therein. It is the responsibility of the Contractor to ensure that this preparation is properly completed prior to application of finishes under such other Sections.

1.3. RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Principal classifications of work related to the work of this Section are listed below and are specified to be performed under the indicated Sections of the Specifications. Refer to the indicated Sections for description of the extent and nature of the indicated work, and for coordination with related trades. This listing may not include all related work items, and it is the responsibility of the Contractor to fully coordinate the work of this Section with that of all other trades to complete the work contained within the Contract Documents (contract, contract drawings and specifications).

1.4. INTENT

A. It is the intent of this Section to require close coordination between operations involving the removal and modification of various portions of the existing structure and operations applying new construction and finishes to the structure. Coordination is required to ensure proper fit between the several parts of the work, without damage to existing construction to remain, resulting in substantial construction and systems that are fully operational in accordance with the Contract Documents. This coordination is the responsibility of the Contractor under Article 2 of the Contract. Refer also to Section 01040, Coordination.

1.5. DEMOLITION

A. Demolition operations shall be performed under the Demolition Sections, as applicable, subject to provisions herein.

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B. Contractor shall be responsible for all shoring, bracing and other support and protection of existing construction and new work required to maintain integrity of existing structure and work in progress during all demolition operations. Include all platforms, barriers, weather protection, lighting, warning signs, and all other means necessary for proper protection of property, personnel, the public and other construction. Designate individuals responsible for the supervision and coordination of this protective work who have appropriate training and experience. TPM may request documentation of the training and experience of the individuals and, if deemed inadequate, TPM may require other individuals that meet this requirement.

C. Plan and carry out demolition operations with utmost care to prevent excessive vibration, settlement or other structural damage, or damage to existing finish materials to remain.

D. Protect the work against fire, including setting and enforcing safety rules in the operation of welding and cutting torches and other heat-producing equipment and activities, and maintaining fire protection and procedures.

1.6. PREPARATION AND CLEANING OF EXISTING SURFACES

A. Prepare and clean existing surfaces to remain as required for installation of new materials, equipment and finishes specified in other specification sections.

B. For all surfaces scheduled or otherwise indicated to be refinished, clean off materials such as old paint, rust, adhesive, dirt, oil, wax, sealers and all other materials that would prevent proper adhesion of new finish materials, or would bleed through, texture or otherwise adversely affect the new finish. Clean existing surfaces to receive new finishes thoroughly, removing all spoilage and applied material, or whatever nature, that would impair bond of new finish to such surface, or would show through new finishes as a different color or texture than other surfaces of the same type.

C. Use scrapers, brushes, sanding, wire pads, detergents, chemical cleaning solutions, solvents, light sand blasting, or other materials and equipment appropriate for surfaces being cleaned. Use all materials in strict conformance to the manufacturer's instructions and recommendations. Dispose of all cleaning solutions and/or solvents in accordance with applicable law. Maintain Material Safety Data Sheets (MSDS) onsite for all products being used onsite in accordance with OSHA regulations.

D. Do not sand blast exposed to view masonry.

E. Surfaces to receive paint finishes shall be cleaned to meet requirements of paint materials of paint materials applied and shall be smooth and even in appearance and to touch. Sand and feather all paint edges to eliminate visible layering or chipping related to multiple coats of paint. It is not required that all adherent paint or other existing finish be removed completely, so long as surfaces are in proper condition to receive new finish to satisfaction of TPM and Architect.

F. Submit proposed cleaning materials, and methods proposed for their use, to TPM for review before proceeding. Clean test areas for TPM's review before proceeding with complete cleaning operations.

G. After cleaning is completed, brush or rinse surfaces to remove cleaning agents or residue

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and leave surfaces ready for installation of new finishes.

H. In addition to preparation work specified above, clean existing finished surfaces that will remain exposed-to-view and unaltered in the finished work.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 01120

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the provisions of the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:

1. Pre-Construction Conference
2. Pre-Installation Conferences
3. Coordination Meetings
4. Progress Meetings

B. Construction schedules are specified in another Division-1 Section.

1.3. PRE-CONSTRUCTION CONFERENCE

A. A pre-construction conference and organizational meeting will be scheduled at the Project site or other convenient location no later than 30 days after Notice of Award and prior to commencement of construction activities.

B. Attendees: The Owner, Architect, Total Program Manager and their consultants, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule
2. Critical Work sequencing
3. Designation of responsible personnel
4. Procedures for processing field decisions and Change Orders
5. Procedures for processing Applications for Payment
6. Distribution of Contract Documents
7. Submittal of Shop Drawings, Product Data and Samples
8. Preparation of record documents
9. Use of the premises
10. Office, Work and storage areas

11. Equipment deliveries and priorities
12. Safety procedures
13. First aid
14. Security
15. Housekeeping
16. Working hours

1.4. PRE-INSTALLATION CONFERENCES

A. Conduct a pre-installation conference at the site prior to commencing each new phase or type of construction or whenever work requires special coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Contractor shall advise the Total Program Manager of all scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:

a. Contract Documents
b. Options
c. Related Change Orders
d. Purchases
e. Deliveries
f. Shop Drawings, Product Data and quality control samples
g. Possible conflicts
h. Compatibility problems
i. Time schedules
j. Weather limitations
k. Manufacturer's recommendations
l. Compatibility of materials
m. Acceptability of substrates
n. Temporary facilities
o. Space and access limitations
p. Governing regulations
q. Safety
r. Inspection and testing requirements
s. Required performance results
t. Recording requirements
u. Protection

2. Record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Total Program Manager.

3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and

reconvene the conference at the earliest feasible date.

1.5. TPM COORDINATION MEETINGS

A. Project coordination meetings will be held at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

B. Representation at each meeting is required by every party currently involved in coordination or planning for the construction activities involved.

C. Meeting results will be distributed to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. Advise TPM of all scheduled coordination meeting times and dates.

1.6. PROGRESS MEETINGS.

A. Progress meetings will be held each week at the Project site or as deemed necessary by the TPM.

B. Attendees: In addition, Total Program Manager, each Contractor, supplier or other entity currently working on the project or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

C. Agenda: Review minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

1. Safety: Review any incidents, accidents, near misses and first aids with an emphasis on lessons learned and corrective actions. Review SOR participation and trends with a focus on areas requiring special attention. Review upcoming work to identify any new or unusual hazards and special safety precautions including additional training.

2. Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Construction Schedule, whether on time or ahead or behind 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.

3. Review the present and future needs of each entity present, including such items as:

   a. Interface requirements
   b. Time
   c. Sequences
   d. Deliveries
   e. Off-site fabrication problems

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f. Access
g. Site utilization
h. Temporary facilities and services
i. Hours of Work
j. Hazards and risks
k. Housekeeping
l. Quality and Work standards
m. Change Orders
n. Documentation of information for payment requests

D. Reporting: No later than 3 days after each progress meeting date, minutes of the meeting will be distributed to each party present and to other parties who should have been present.

1. Schedule Updating: The construction schedule will be revised monthly, by the Contractor, where revisions to the schedule have been made or recognized.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 01200

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SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the provisions of Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements for Submittals required for performance of the Work, including;

1. Submittal schedule
2. Daily construction reports
3. Shop Drawings
4. Product Data
5. Samples

B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Permits
2. Applications for payment
3. Performance and payment bonds
4. Insurance certificates
5. List of Subcontractors

C. The Schedule of Values submittal is included in Section "Applications for Payment."

D. Inspection and test reports are included in Section "Quality Control Services."

1.3. SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of Submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other Submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of Submittals for related elements of the Work so processing will not be delayed by the need to review Submittals concurrently for coordination.

a. The Total Program Manager reserves the right to withhold action on a submittal requiring coordination with other Submittals until related Submittals are received.

3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process Submittals, including time for re-Submittals.
    a. Allow three weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent Submittals. The Total Program Manager will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
    b. If an intermediate submittal is necessary, process the same as the initial submittal.
    c. Allow two weeks for reprocessing each submittal.
    d. No extension of Contract Time will be authorized because of failure to transmit Submittals to the Total Program Manager sufficiently in advance of the Work to permit processing.
    e. No submittal should be delayed as a result of an RFI. All RFIs pertaining to submittals are to be incorporated into the submittal and are not to affect the scheduled submittal submission date.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken.
    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Number and title of appropriate Specification Section.
    i. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to the Total Program Manager using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

1. On the transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.
2. Transmittal Form: A sample form will be provided at a later date for the transmittal of Submittals.

1.4. SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of Submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.

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1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
2. Prepare the schedule in chronological order; include Submittals required during the first 90 days of construction. Provide the following information:
   a. Scheduled date for the first submittal
   b. Related Section number
   c. Submittal category
   d. Name of subcontractor.
   e. Description of the part of the Work covered
   f. Scheduled date for re-submittal
   g. Scheduled date for the Architect's final release or approval.

B. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made.

1.5. DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Total Program Manager at weekly intervals:

1. List of subcontractors at the site
2. Exact count of personnel at the site by trade or contractor/subcontractor
3. High and low temperatures, general weather conditions
4. Accidents and unusual events; damages caused or noticed
5. Meetings and significant decisions
6. Stoppages, delays, shortages, losses
7. Meter readings and similar recording.
8. Emergency procedures
9. Orders and requests of governing authorities
10. Change Orders received, implemented
11. Services connected, disconnected
12. Equipment or system tests and start-ups
13. Partial Completions, occupancies
14. Substantial Completions authorized
15. Description of area and work performed for that day and any activities that were completed
16. Deliveries of equipment and materials

1.6. SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

1. Dimensions.

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2. Identification of products and materials included.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurements
6. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
7. Appropriate designer stamp if required by specs
8. Submittals: submit electronically to TPM and ensure appropriate scale is applied to measurements

C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.

1. Preparation of coordination Drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
2. Submit coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

1.7. PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
   a. Manufacturer's printed recommendations
   b. Compliance with recognized trade association standards
   c. Compliance with recognized testing agency standards
   d. Application of testing agency labels and seals
   e. Notation of dimensions verified by field measurement
   f. Notation of coordination requirements
   g. MSDS (material safety data sheet) on each product
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
3. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options is required.
4. Submittals: Submit eight copies of each required submittal; one copy will be returned with action taken and corrections or modifications required.
   a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

a. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.8. SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's Sample. Include the following:
   a. Generic description of the Sample.
   b. Sample source
   c. Product name or name of manufacturer
   d. Compliance with recognized standards
   e. Availability and delivery time

2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
   a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
   b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
   c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample Submittals.

3. Preliminary Submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
   a. Preliminary Submittals will be reviewed and returned with the Architect's mark indicating selection and other action.

4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit three sets; one will be returned marked with the action taken.

5. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
   a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
   b. Sample sets may be used to obtain final acceptance of the construction associated with each set.

B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

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1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
   a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.9. ARCHITECT'S ACTION

A. Except for Submittals for record, information or similar purposes, where action and return are required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.
   1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked.

1.10. REPETITIVE REVIEW

A. Shop drawings, product data and samples submitted for each item, will be reviewed no more than two (2) times at TPM's expense. Submitted shop drawings, product data and samples failing to comply with Contract requirements after two (2) reviews will be performed at times convenient to the TPM and at the Contractor's expense, based upon a flat rate of $75.00 per hour not to exceed $600.00 per each subsequent re-submittal. Contractor shall reimburse TPM for additional submittal reviews (above the two (2) per each submittal) and TPM reserves the right to deduct said reimbursement from Contractor's monthly application for payment (progress payment). All such deductions will be documented in a change order that adjusts the Contract Price accordingly.

B. Need for resubmission of shop drawings, or delay in obtaining Architect's review of Submittals, shall not entitle Contractor to an extension of Contract Time nor increase Contract Price, nor shall it become the basis for a "Damages for Delay" claim.

1.11. COLOR AND FINISHES

A. Architect will prepare a master color schedule indicating required color, finish, pattern, material, texture, and other pertinent information in connection with interior and exterior finishes.

B. To facilitate preparation of such schedule, Contractor shall submit, within forty-five (45) calendar days following Notice of Award, unless otherwise extended by TPM, names of manufactures whose products he proposes to use within framework of Specifications, whenever color, finish pattern, texture, or other related information is a consideration, e.g., paint, ceramic tile, resilient flooring, acoustical ceiling tile, toilet partitions, and other items for which the above properties affect design.

C. Submit color chips for all items having color unless otherwise directed or approved by TPM. Upon expiration of such 45-day period, Architect will proceed with color selection and preparation of final color schedule.

D. Architect will select colors and finishes of a manufacturer within framework of Specifications, for each item where Contractor fails to submit name of a specific manufacturer within allotted time, and Contractor provide such materials without additional compensation.

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PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 01300

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SECTION 01315

PROGRESS SCHEDULES AND REPORTS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the provisions of Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. PROGRAM DESCRIPTION

A. A Critical Path Method (CPM) construction schedule shall be used to control work of this Contract and to provide a definitive basis for determining job progress. Construction schedule shall be prepared by Contractor. Work shall be performed in compliance with established CPM schedule and the Contractor, and his subcontractors shall, be responsible for cooperating fully with TPM in effectively utilizing the CPM schedule.

B. Each CPM schedule prepared and submitted by Contractor, shall consist of a CPM network (diagram of activities) and a computer-generated schedule (both in hard copy and on computer disk) as specified. Format shall be activity-on-node precedence network as follows:

1. Illustrate a feasible CPM schedule for completion of work under the Contract within time specified.
2. Establish mandatory milestone dates.

C. TPM will utilize current updates of PRIMAVERA in analyzing construction schedules. The Contractor will utilize a compatible scheduling program to prepare its schedules.

D. Contractor shall develop its own outline of Work and prepare its proposed CPM Schedule. Computer-based schedule shall be compatible with PRIMAVERA P6.

E. Adverse weather that is normal for the Okaloosa County area must be taken into account in the CPM schedule.

1. No extensions of the completion date will be considered until the Contractor has actually lost thirty (30) working days due to adverse weather, and the Contractor has given the TPM proper notice in accordance with the Contract Documents, of the days lost due to adverse weather. Article 5.3.1 of the Contract for Construction Services shall govern any request for time due to weather related impact(s).

F. Time extensions due to adverse weather conditions will not be granted unless the Contractor can establish that the critical path activity that was to be performed on that particular day was affected, and only if all of its successors' float time has been exhausted so that the Completion Date is extended.

1.3. NETWORK REQUIREMENTS

A. Network shall show order and interdependence of activities and sequence in which work is to be accomplished as planned by Contractor. Basic concept of a network analysis

diagram shall be followed to show how start of a given activity is dependent on completion of preceding activities and its completion restricts start of following activities:

1. Include Detailed Network Activities: Construction activities, submittal and approval of samples of materials and Shop Drawings, procurement of materials and equipment, fabrication of materials and equipment, and their delivery, installation, and testing, start-up and training. Contractors shall break work into activities with duration no longer than 20 working days each, except as to non- construction activities (such as procurement of materials and delivery of equipment) and other activities for which the TPM may approve the showing of longer duration. To extent feasible, activities related to specific physical areas of work and/or systems shall be segregated on network for ease of understanding and simplification.
2. Provide separate activities for each significant identifiable function in each trade area in each facility. Activities shall show duration and remaining duration. Specific activities which shall be included are: Interface work between Contractor and other contractors, subcontract work, interface work between subcontractors and between the Contractor and subcontractors, electrical connections to each item of equipment, supplier and manufacturer technical assistance, mechanical connections to each item of equipment, tests, activities necessary for coordination.

B. Each activity on network shall have following indicated on the node representing it:

1. Duration and remaining duration for those activities in progress
2. A five-character (or less) code indicative of party responsible for accomplishing activity
3. A brief description of activity
4. Cost associated with each activity and its tie to the line item on the Schedule of Values as noted in 1.3.C of this section

C. Selection and number of activities shall be subject to TPM's approval. Detailed network shall be time scaled. In addition to brief description, Contractor shall submit a separate list of activities containing a detailed narrative of the scope of each activity, including trades and subcontractors involved, activity duration, and cost of each activity as it pertains to pay items on Schedule of Values. Cost for each work activity shall include mobilization, materials, labor, equipment, overhead, and profit.

D. To the extent that network or any revision thereof shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been approved by TPM. Failure to include on a network any element of work required for performance of this Contract shall not excuse Contractor from completing work required within any applicable completion date, notwithstanding review of network by TPM.

E. Where earlier completion of certain milestones is specified, CPM schedules which show completion of work prior to the Contract completion date may be approved by TPM, but in no event shall failure to complete early be acceptable as a basis for claim of delay against TPM by the contractor.

1.4. COMPUTER-GENERATED SCHEDULE REQUIREMENTS

A. Each computer-generated schedule submittal from CPM activity network shall include following tabulations: a list of activities in numerical order, a list of activity precedence, a

schedule sequenced by Early Start Date, and a schedule sequenced by Late Start and Total Float. Each schedule shall include the following minimum items:

1. Activity numbers
2. Estimated duration
3. Activity description
4. Early start date (calendar dated)
5. Early finish date (calendar dated)
6. Latest start date (calendar dated)
7. Latest finish date (calendar dated)
8. Status (whether critical)
9. Total float and free float

B. In addition, each schedule shall be prefaced with following summary data:

1. Contract name and number
2. Contractor's name
3. Contract duration
4. Contract schedule
5. The effective or starting date of schedule (the date indicated in Notice to Award).

C. A narrative shall accompany the diagram providing for each activity:

1. Activity number
2. Activity description
3. Predecessors
4. Successors

D. Advise TPM of calendar used for Schedule. Calendar should be based on actual workweek anticipated by Contractor; whether 5 or 6 days a week will be worked.

1.5. INITIAL CONFERENCE

A. Within twenty (20) days following receipt of Notice of Award, Contractor shall meet with TPM to discuss and agree on the proposed standards for the CPM schedule. At this conference, Contractor shall submit to TPM a preliminary network defining planned operations during first 60 calendar days after Notice to Proceed. Contractor's general approach for balance of Project shall be indicated. Include cost of activities expected to be completed or partially completed before submission and approval of complete network.

1.6. APPROVED CPM SCHEDULE

A. Within forty-five (45) days following written Notice of Award submit two prints and a digital copy of the proposed CPM activity network and a computer-generated schedule to TPM. Following review by TPM, Contractor shall incorporate TPM comments into network and submit two prints and one reproducible of revised network and two hard copies and a digital copy of generated schedule. This final submittal shall be delivered to Construction

Program Manager within 60 days after Notice of Award.

B. Contractor shall participate in initial review and evaluation of proposed network diagram and schedule by TPM. Approved network shall then be the approved CPM schedule to be used by Contractor for planning, organizing and directing the work, and reporting progress.

C. Approval of CPM activity network by TPM is advisory only and shall not relieve Contractor of responsibility for accomplishing work within the contract completion date. Omissions and errors in approved CPM schedule shall not excuse performance less than that required by Contract. Approval by TPM in no way makes the TPM an insurer of the CPM schedule's success or liable for time or cost overruns flowing from its shortcomings. TPM hereby disclaims any obligation or liability by reason of approval of the CPM schedule.

1.7. PROGRESS REPORTING

A. Report progress on a monthly basis. Contractor and TPM shall evaluate status of work at end of each month to show actual progress and to identify problem areas. Between the 25th and the 30th of each month, Contractor shall submit an updated schedule.

B. Progress and associated costs shown on CPM each month shall be used in determining amounts to be paid through the Pay Estimate each month. Activities as they pertain to pay items of the baseline schedule will be separately totaled for cost of each activity and value of work in place for this period.

1.8. RESPONSIBILITY FOR SCHEDULE COMPLIANCE

A. Whenever it becomes apparent from the current CPM schedule and CPM status report that delays to the critical path have resulted and Contract completion date will not be met, or when so directed by TPM, the Contractor shall take some or all of the following actions at no additional cost to TPM. The Contractor shall submit to TPM for approval, a written statement of steps it intends to take to remove or arrest delay a critical path in approved schedule.

1. Increase construction manpower in such quantities and crafts as will substantially eliminate backlog of work.
2. Increase the number of working hours per shift, shifts per day, working days per week, amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate backlog of work.
3. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities and comply with revised schedule.

B. If the Contractor fails to submit a written statement of steps he intends to take or should fail to take such steps as approved by TPM, the TPM may direct Contractor to increase the level of effort in manpower (trades), equipment, and work schedule (overtime, weekend and holiday work, etc.) to be employed by Contractor in order to remove or recover delay to the critical path in approved schedule, and Contractor shall promptly provide such level of effort at no additional cost to TPM.

1.9. ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME

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A. If Contractor desires to make changes in his method of operating which affect approved CPM schedule, he shall notify TPM in writing stating what changes are proposed and reason for change. If TPM approves these changes, Contractor shall revise and resubmit for approval, without additional cost to TPM, all of the affected portions of the CPM network. CPM schedule shall be adjusted by the Contractor only after prior approval of his proposed changes by TPM. Adjustments may consist of changing portions of the activity sequence, activity durations, division of approved activities, or other adjustments as may be approved by TPM. Addition of extraneous, non-working activities and activities which add unapproved restraints to CPM schedule will not be approved.

B. If completion of any activity, whether or not critical, falls more than 100 percent behind its approved duration, Contractor shall submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.

C. Shop Drawings which are not approved on first submittal or within schedule time, and equipment which do not pass specified tests, shall be immediately rescheduled.

D. Contract completion time will be adjusted only for causes specified in the Contract for Construction Services. In event the Contractor requests an extension of any Contract completion date, Contractor shall furnish such justification and supporting evidence as TPM may deem necessary to determine whether Contractor is entitled to an extension of time under provisions of the Contract. TPM shall, after receipt of such justification and supporting evidence, make findings of fact and shall advise Contractor in writing thereof. If TPM finds that Contractor is entitled to any extension of any Contract completion date, TPM's determination as to the total number of days extension shall be based upon currently approved CPM schedule and on all data relevant to extension. Such data shall be included in next updating of schedule. Actual delays in activities which, according to CPM schedule, do not affect any Contract completion date shown by critical path in the network will not be the basis for a change therein.

E. Contractor shall submit each request for change in Contract completion date to the TPM within ten (10) days after the beginning of delay for which a time extension is requested but before date of final payment under this Contract. No time extension will be granted for requests which are not submitted within the foregoing time limit.

   1. From time-to-time, it may be necessary for Contract schedule or completion time to be adjusted by the TPM to reflect effects of job conditions, weather, technical difficulties, unavoidable delays on part of the Owner or TPM or their representatives, and other unforeseeable conditions which may indicate schedule adjustments or completion time extensions. Under such conditions, TPM will direct Contractor to reschedule the work or Contract completion time to reflect changed conditions, and Contractor shall revise its schedule accordingly. No additional compensation shall be paid to Contractor for such schedule change unless provided for in Article 5 of the Contract for Construction Services. In any case Contractor shall take all possible action to minimize any time extension and any additional cost to TPM.

F. Total float or slack time is defined as amount of time between earliest start date and latest start date or between earliest finish date and latest finish date of a chain of activities on CPM. Float or slack time is not for exclusive use or benefit of either Contractor or the TPM. Contractor's work shall proceed according to early start dates, and TPM shall have

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right to reserve and apportion float time according to needs of project. Contractor acknowledges and agrees that actual delays, affecting paths of activities containing float time, will not have any effect upon contract completion.

1.10. COORDINATING SCHEDULES WITH OTHER CONTRACT SCHEDULES

A. Where work is to be performed under this Contract concurrently with or contingent upon work performed on the same facilities or area by other contractors, Contractor's CPM Schedule shall be coordinated with schedules of the other contractors. Contractor shall obtain the schedules of other applicable contractors from TPM for preparation and updating of its CPM schedule and shall make the required changes in its schedule when indicated by changes in corresponding schedules.

B. In case of interference between the operations of different contractors hired by the TPM, TPM will determine the work priority of each contractor and sequence of work necessary to expedite the completion of entire Project. In such cases, decision of TPM shall be accepted as final. Temporary delay of Contractor's work due to such circumstances shall not be considered as justification for claims for additional time or compensation.

1.11. PHASED CONSTRUCTION

A. The Contractor shall provide notation on schedule to show how the sequence of the Work is affected by the phased completion requirements, if applicable.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION 01315

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SECTION 01400

QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements for quality control services.

B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Architect.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
3. Requirements for the Contractor to provide quality control services required by the Architect, Owner, TPM or authorities having jurisdiction are not limited by provisions of this Section.

1.3. RESPONSIBILITIES

A. Contractor Responsibilities: The Contractor shall provide **all** inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities regardless if it is specified as a requirement of the Owner or TPM. These services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Price.

1. The Contractor shall employ and pay an independent agency, to perform specified quality control services.

2. Re-testing: The Contractor is responsible for re-testing where results of required inspections, tests or similar services prove unsatisfactory and do not indicate

compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility. Cost of re-testing construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.

a. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
b. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
c. Assisting the agency in taking adequate quantities of representative samples of materials that require testing.
d. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
e. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
f. Security and protection of samples and test equipment at the Project site.

B. TPM Responsibilities: The TPM will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, for **forensic testing only**. Costs for these services are not included in the Contract Price but may be passed on to the Contractor if the failure is due to Contractor's workmanship or materials.

C. Duties of the Testing Agency: The independent testing agency engaged by Contractor to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Architect, TPM, and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Architect, TPM and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
3. The agency shall not perform any duties of the Contractor.

D. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.4. SUBMITTALS

A. The independent testing agency shall submit certified reports of each inspection, test or similar service, to the TPM and Contractor responsible for the service. If the Contractor is responsible for the service, Contractor will ensure that TPM is sent certified written reports of each inspection, test or similar service within one (1) day of receiving report.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
   a. Date of issue.
   b. Project title and number.
   c. Name, address and telephone number of testing agency.
   d. Dates and locations of samples and tests or inspections.
   e. Names of individuals making the inspection or test.
   f. Designation of the Work and test method.
   g. Identification of product and Specification Section.
   h. Complete inspection or test data.
   i. Test results and an interpretations of test results.
   j. Ambient conditions at the time of sample-taking and testing.
   k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
   l. Name and signature of laboratory inspector.
   m. Recommendations on re-testing.

1.5. QUALITY ASSURANCE

A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are pre-qualified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.1. REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."

B. Protect construction exposed by or for quality control service activities and protect repaired construction.

C. Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

3.2. ADDITIONAL REQUIREMENTS

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A. Concrete: At a minimum, each truck will be slump tested. Unless otherwise specified more frequently, test cylinders will be cast for every 25 cubic yards poured and for every pour that is for a structural member (I.e. - column, beams, foundations, footings, etc.) regardless of the amount.

END OF SECTION 01400

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SECTION 01441

CONTRACTOR'S QUALITY PROGRAM REQUIREMENTS

PART 1 - GENERAL

1.1. The Contractor shall develop a site-specific quality program which describes the Contractor's organization, procedures, and processes for quality assurance and quality control of all aspects of the work scope. The quality program shall be documented and shall be reviewed and approved by the Total Program Manager. The program shall assure adequate quality throughout all areas of contract performance; for example, shop drawing/detailing, procurement of materials, receiving, storage, fabrication, assembly, inspection, testing, shipping, and site installation. At a minimum, Contractor's Quality Program shall include the following:

A. Contractor QC Organization
   1. Names and qualifications of QC staff
   2. Duties, Responsibilities & Authority of QC Staff
   3. List of Competent Persons
   4. Personnel Certifications Log

B. 3rd Party QC Organizations & Qualifications

C. Submittal Procedures & Register

D. Testing Laboratory Information

E. Testing Plan & Test Register

F. Inspection Plan & Inspection Register

G. Procedures to Complete Rework Items

H. QC Documentation and Reporting Procedures

I. List of Definable Features of Work (DFOW)

J. Procedures for Performing the Three Phases of Control

K. Procedures for Completion Inspections

L. Training Procedures & Training Register

1.2. The program shall provide for the prevention and ready detection of discrepancies and for timely and positive corrective action.

1.3. Instructions and records for quality must be maintained and kept available for the Total Program Manager's review.

PART 2 - QUALITY MANAGEMENT

2.1. The Contractor's organization for effective management for quality shall be clearly prescribed by the Contractor. Personnel performing quality functions shall have sufficient, well-defined responsibility, authority and the organizational freedom to identify and evaluate quality problems and to initiate, recommend or provide solutions.

2.2. The Contractor's quality assurance personnel shall have the authority and responsibility to stop work if safety of personnel or damage to the Work or equipment is imminent.

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2.3. The Contractor shall provide and maintain clear and complete documented instructions to implement requirements of engineering drawings and specifications and to provide explicit direction to personnel, when such as appropriate to assure quality fabrication, assembly, or installation of complicated, sensitive, or delicate materials and equipment.

2.4. The Contractor's records for monitoring work performance and for inspection, measurement, and testing shall indicate the acceptability of work or materials and the action taken in connection with deficiencies.

PART 3 - DESIGN DOCUMENT CONTROL

3.1. The Contractor shall maintain a design document change control system which will assure that outdated and superseded drawings, specifications, and instructions are not used in the work.

PART 4 - CONTROL OF PURCHASES

4.1. The Contractor is responsible for assuring that all materials, equipment, and services procured from its suppliers (subcontractors and vendors) conform to the contract requirements.

4.2. The Contractor's responsibility for the control of purchases shall include the establishment of a procedure for (1) the selection of qualified suppliers, (2) the transmission of applicable design and quality requirements in the contracts and associated technical requirements, and (3) evaluation of the adequacy of procured items.

4.3. Contractor shall inspect and test (if required by the contract with the Total Program Manager) purchased materials and equipment to verify conformance to applicable requirements. The extent of inspection shall be consistent with the nature and intended application of the material and equipment.

PART 5 - SHIPPING, RECEIVING, HANDLING AND STORAGE

5.1. The Contractor's quality program shall provide for adequate work and inspection instructions for shipping, receiving, handling, storage, and preservation to protect the quality of materials and equipment, and prevent damage, loss, deterioration, degradation, or substitution of materials.

5.2. Before any major fabricated assembly is shipped from the Contractor's or supplier’s facility, an “Okay to Ship” authorization shall be obtained from the TPM.

5.3. All work shall be done in accordance with the specifications. Any request for use of alternate or non-conforming materials shall be presented to the TPM in accordance with Specifications Section 01631 and must match approved submittals.

PART 6 - CONTROL OF FABRICATION, ASSEMBLY AND INSTALLATION

6.1. The Contractor shall plan, document and implement a program which will assure that each phase of fabrication, assembly and installation meets and maintains the requirements of applicable drawings and specifications.

6.2. The Contractor's quality program shall assure that all fabrication, assembly and installation of materials and equipment is accomplished under controlled conditions.

6.3. Controls shall be established to ensure that only conforming materials are released and used.

6.4. Fabrication, inspection, and installation and test areas shall be controlled to provide proper cleanliness levels for work areas, work surfaces, tools, fixtures, handling, storage and shipping containers, and test and inspection equipment to prevent contamination.

6.5. When required by the contract with the Total Program Manager, Contractor personnel, or their subcontracted personnel, performing or controlling certain critical fabrication, assembly, installation and inspection processes shall be qualified proficient. Qualification of personnel shall be based on demonstrated proficiency which will include training and testing. Examples of critical processes include welding, X-raying, and ultrasonic testing.

PART 7 - INSPECTION AND TESTING

7.1. The Contractor shall use and maintain calibrated measuring, test and inspection equipment of suitable range, accuracy and type to assure conformance of materials and equipment to technical requirements. All measuring, test and inspection equipment used to accept or install equipment/materials shall be certified against a standard having greater accuracy and is traceable to National Standards.

7.2. When transits, levels, theodolites, tapes, scales, gauges, templates, production jigs, fixtures, tooling masters, and such other devices are used for testing and measuring, they shall be proved for accuracy prior to release for use. These devices shall be proved again for accuracy at intervals formally established in a manner to cause their timely adjustment, replacement or repair prior to becoming inaccurate.

7.3. **Contractor Self-Performed QC Inspections & Tests.** The Contractor shall perform, and document in Procore, all QC inspections & tests not otherwise performed by third party QA/QC firms retained by the Contractor. Through random sampling of Contractor inspections and tests and related document control records, TPM will monitor the Contractor's compliance in performing the following:

A. Material Receipt and Storage Inspections for all material and equipment delivered to the project site. Also refer to Section 01600 – Materials and Equipment for additional delivery, storage, protection and handling requirements.

B. Initial Phase Inspections at the start of each Definable Feature of Work (DFOW). Refer to List of DFOW submitted as part of Contractor's QC Plan.

C. Follow-up Phase Inspections on a daily basis for on-going work as evidenced by appropriate QC data entered in Contractor Daily Reports.

D. QA Testing by properly qualified personnel of such material and equipment as required by the technical specifications and contract documents.

E. Completion Inspections as follows:

1. Punch List Completion Inspections as required to develop a complete punch list of

incomplete and/or deficient work.

2. Pre-Final Completion Inspection as required to verify that the facility is ready to be occupied.
3. Final Acceptance Inspection as required to verify that all prior punch list work is completed and/or corrected.
4. Also see Section 01700 – Project Closeout for additional requirements.

F. End of Warranty Inspection Prior to the end of the warranty period(s) for each project, the applicable Contractor shall perform, jointly with TPM, an End of Warranty Inspection to determine if there are any known or observed defects or deficiencies in the Work which are still covered by warranty and then initiate the required corrective actions.

7.4. **3rd Party Performed QC Inspections & Tests.** The Contractor shall retain and pay for qualified 3rd Party inspections and testing as required by the contract documents, including the following:

A. Threshold Inspections The TPM shall provide the services of a qualified threshold inspector to provide threshold inspection services of the Work, as required by applicable laws and codes.

B. Inspections by Authorities Having Jurisdiction (AHJ) The Contractor shall notify TPM in order to coordinate all AHJ entities and schedule all applicable inspections and tests with such AHJ entities to maintain the progress of the Work. The TPM shall notify Contractor of all scheduled AHJ inspections.

C. Testing Laboratory Services Unless otherwise indicated in the contract documents, the Contractor shall provide the services of a qualified independent Testing Laboratory, acceptable to TPM, to inspect and test the Work and provide reports.

D. Distribution of Inspections & Test Reports The Contractor shall ensure that TPM is notified immediately of any failed inspections and tests and copied directly by the testing laboratory and/or inspection firm on all inspection and test reports.

7.5. **Off-Site Plant/Shop Inspections** The Contractor shall ensure that off-site fabrication facilities, shops and plants have required inspections performed and provide adequate prior notice to TPM of any scheduled off-site inspections in order to allow them to attend, if desired. At its option, TPM may make random visits to such offsite facilities to spot check the quality control processes, observe facility fabrication progress, and/or review calibrations or certifications in an effort to monitor Contractor compliance with the project specifications.

7.6. **Calibration of Testing Equipment**. The Contractor shall provide evidence that all applicable testing equipment has been properly calibrated. Submittals and test reports shall also include appropriate equipment identification information. TPM may make random spot checks of test equipment used in the field to monitor Contractor's compliance.

7.7. **Scheduling/Witnessing of Inspections & Tests.** The Contractor shall properly notify TPM of all scheduled inspections and tests in order to allow TPM to witness such inspections or tests, as deemed appropriate. All tests witnessed shall be properly documented.

7.8. **Control of Field Work.** The Contractor shall provide TPM written documentation of all field

engineering, survey and layout work, including field notes. Also refer to Section 01050 - Field Engineering.

PART 8 - QA/QC DOCUMENTATION AND REPORTING

8.1. **Non-Conformance Reporting**.

A. Notices of Non-Conformance When TPM observes possible non-conforming work, TPM will notify Contractor of the items in question, which will be documented and/or photographed where feasible and entered into the Procore QA/QC module. If the issue is deemed significant, a Notice of Non-Compliance (NNC) will be issued to the Contractor and requests the Contractor to initiate a similar NNC to its responsible subcontractor, as applicable. TPM and Contractor will track all NNC's in Procore until the issue is corrected and closed out.

B. Incomplete and Deficient Work Lists The Contractor shall maintain an on-going list of incomplete and deficient work items in their records for review with TPM on a regular basis. TPM may request that additional items be added and tracked on this list.

C. Punch Lists The Contractor shall prepare punch lists in conjunction with project inspections outlined above.

D. Re-Inspection Costs Should TPM incur additional costs, whether from third parties or its own staff, resulting from the re-inspection of deficient work or additional inspections otherwise required due to Contractor's lack of adequate notice or scheduling, TPM reserves the right to withhold such costs from payments otherwise due the Contractor.

8.2. **QA Document Control.** The Contractor shall use Procore, as required by the contract documents, to manage QA/QC for the project. TPM will use Procore to monitor, track and report on the Contractor's compliance with QA/QC requirements.

PART 9 - QA/QC RELATED MEETINGS

9.1. The following QA/QC related meetings will be conducted by Contractor with TPM in attendance and documented in Procore by the Contractor. Also refer to Section 01200 – Project Meetings.

A. QA/QC Coordination and Mutual Understanding Meeting will be conducted by Contractor. The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, design intent, commissioning, environmental requirements and procedures, coordination of activities to be performed, special inspections, and the coordination of the Contractor's management, production, and QC personnel. It is held after submission of the Contractor's QC Program and prior to the start of work.

B. Pre-Installation Meetings will be conducted by the Contractor. The purpose of these meetings is to review the DFOW prior to beginning a major unit of work. Special attention will be paid to any mockups or sample construction which may become the baseline for acceptable quality.

C. Weekly QA/QC Meetings will be conducted by the Contractor. The purpose of these

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meetings is to provide regular review of QC related issues and progress with the Contractor's supervisory and QC staff and TPM. This meeting may be made a part of the regular Weekly Progress Meeting.

END OF SECTION 01441

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SECTION 01460

ROOFING INSTALLER'S WARRANTY

A. WHEREAS <NAME> of <ADDRESS>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner:
2. Address:
3. Building Name/Type:
4. Address:
5. Area of Work:
6. Acceptance Date:
7. Warranty Period:
8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for **designated Warranty Period of two (2) years upon final roof acceptance**.

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. peak gust wind speed exceeding < > mph;
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.
3. The Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents, resulting

from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray- cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <DAY> day of <MONTH>, 20<YEAR>.

1. Authorized Signature:
2. Name:
3. Title:

END OF SECTION 01460

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SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection and the use of owner's facilities and premises. Provisions for providing the various support facilities, utilities, etc., are outlined in the Scope of Work/Special Conditions of the Contract for Construction Services.

B. Temporary utilities required include but are not limited to:

1. Water service and distribution.
2. Temporary electric power and light.
3. Internet service.
4. Storm and sanitary sewer.

C. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

1. Building Code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, Fire Department and Rescue Squad rules.
5. Environmental protection regulations.

D. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.
2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

E. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.3. PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.1. MATERIALS

A. General: Provide new materials; if acceptable to the TPM, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Water: Provide potable water approved by local health authorities.

C. Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6-feet high and galvanized steel pipe posts, 1-1/2" I.D. for line posts and 2-1/2" I.D. for corner posts to enclose the construction site, and to remove same upon completion.

2.2. EQUIPMENT

A. General: Provide new equipment; if acceptable to the TPM, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

B. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

G. Temporary Toilet Units: Only temporary/chemical toilet units set up around project area

are to be use by project personnel.

H. First Aid Supplies: Comply with governing regulations.

I. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1. INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities as directed by the TPM. Relocate and modify facilities as directed by the TPM.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until directed by the TPM.

3.2. TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility companies to install temporary services or connect to existing services. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the company/owner and for a time when service can be interrupted, where necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction.
3. Temporary electrical power used on the Project will be paid for by the Contractor.

B. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.

1. Install a 110/208 service panel at each floor as directed by the TPM.
2. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

C. Temporary Lighting: Provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions. Temporary lighting must comply with minimum lighting requirements per jurisdictional authorities but in no case be less 15-foot candles per room.

D. Internet Service: (500 MBPS exclusively for Jacobs|Titan , nonshared)

E. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
2. Connect temporary sewers to the municipal system as directed by the sewer department officials.
3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

3.3. TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities in areas designated by the TPM.

1. Maintain temporary construction and support facilities until Substantial Completion. This includes removal of weeds, debris, trash and clean-up of the area after removal of such temporary structures. Offices and sheds shall be of suitable design, maintenance and appearance, and meet the approval of the TPM and all applicable local codes. Temporary field offices and sheds shall be relocated as required to complete scheduled Work and shall not be used for living quarters. Provide workspace and utilities for TPM personnel as specified in Article 2 paragraph 2.17 of the contract. Remove prior to Substantial Completion. Structures not removed in a timely manner will be removed by the TPM at the Contractor's expense. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Provide incombustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.

C. Temporary Conditioning: Provide temporary conditioning required by construction activities, for curing or drying of completed installations, or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

D. Sanitary facilities include temporary toilets, wash facilities and drinking water source. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
2. A potable water source will be provided. Contractor will be responsible for providing drinking water at the various floors for consumption by the Contractor's personnel.
3. Vending machines and food service vehicles shall not be allowed on the Project site

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without the written consent of the Owner and TPM. Owner's existing food service facilities are not to be used by Contractor's personnel working on-site.

E. Toilets: Install toilet units tied into the existing sanitary sewer piping. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted. Use of the Owner's existing toilet facilities will not be permitted.

F. Wash Facilities: Install wash facilities supplied with potable water as directed by the TPM for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

G. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Install tarpaulins securely, with UL labeled fire-retardant treated material framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
4. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.

H. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees as required.

I. Temporary Elevator Use: Refer to Division-14 "Elevator" Sections. Upon completion of the elevator, the same may be utilized to access the various floors. Use of the elevator requires prior approval of the TPM.

J. Signage: Contractor signs shall not be allowed on site except on its equipment and trailers and to provide necessary direction and safety information to workers, which signs must be approved in advance by TPM. If included in Contractor Scope of Work, Contractor shall provide and maintain a Project sign in accordance with the specifications provided by TPM.

K. Temporary Exterior Lighting: Install exterior yard lights as directed by the TPM.

L. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from each other and other waste by containerizing properly. Dispose of material in a lawful manner.

M. Stairs: If existing stairways are available for access to the various floors, protect existing stairways so that finishes will remain in a condition equal to those prior to the commencement of Work. Cover refurbished stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

3.4. SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the TPM.

B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations"

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
4. Provide supervision and a properly rated fire extinguisher at all locations of welding operations, combustion type temporary heating units, and similar sources of fire ignition. Fire Extinguishers are to be appropriately tagged and charged.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

E. Enclosure Fence: Before any excavation begins, install an enclosure six foot (6') high fence with lockable entrance gates. Locate where indicated or enclose the entire site or the portion determined sufficient to accommodate construction operations. When the construction work takes place on an existing school site, any additional fencing that may be required due to the school's operations will be the responsibility of the Contractor to provide as part of its Contract Price. Install fencing in a manner that will prevent people, dogs and other animals from easily entering the site, except by the entrance gates.

1. Provide open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.

F. Covered Walkway: If required, erect a structurally adequate protective covered walkway for passage of persons along any adjacent sidewalks. Coordinate with entrance gates, other facilities and obstructions. Comply with regulations of authorities having jurisdiction.

1. Construct using scaffold or shoring framing, waterproofed wood plank overhead

decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well- drained walkways and similar provisions for protection and safe passage. Extend the back wall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Owner and TPM.

G. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

H. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site. All pumping, dewatering and drainage necessary to keep site utility lines, sewers, manholes, foundations, sumps, meter pits, excavations and other areas free from water shall be the responsibility of the Contractor. Pumped water shall be filtered as necessary to screen silts prior to putting water into storm systems. Also, provide silt fencing and turbidity screens to prevent silt erosion into existing storm lines and retention ponds. All other pumping necessary to keep the building and site free from water shall be the responsibility of the Contractor. Do not discharge water onto adjoining property.

3.5. OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the TPM requests that it be maintained longer, remove each temporary facility when the need has ended, or when 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 the 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 the Contractor.
2. Remove temporary paving that is not intended for or acceptable for integration into

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permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances which might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
   a. Replace air filters and clean inside of ductwork and housings.
   b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
   c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01500

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SECTION 01561

CLEANUP

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. General: This Section specifies minimum requirements for cleaning up and removal of waste and debris from the Project site.

1.3. SUBMITTALS

A. When utilizing chemical cleaning products, especially inside occupied facilities, submit product data to TPM prior to use.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION

3.1. Examine Project site and Work areas multiple times each day for accumulations of waste and debris.

3.2. Cleaning During Construction:

A. Contractor shall:

1. Clean up all waste materials, rubbish, debris and soil residue resulting from its own operations at such frequencies as required by TPM, but no less than prior to quitting time daily.
2. Transport and place waste materials, rubbish and debris outside of building in trash containers provided by Contractor.
3. Remove grease, dust, dirt, stains, labels, fingerprints, form oil, concrete spills and other foreign materials from interior and exterior surfaces of fixtures, hardware and equipment furnished as part of this contract.
4. Repair, patch and touch-up marred surfaces to match adjacent finishes damaged by its operations.

B. If Contractor is causing dirt or debris to be deposited on any driveway, parking area, highway, road, street, or on any other public or private property, immediately clean up that public or private property to the satisfaction of the TPM and Owner.

C. Debris of a hazardous or flammable nature shall be legally and properly removed from the job site and disposed of daily by the Contractor. When, in the opinion of the TPM, a

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potentially hazardous condition exists, the Contractor shall be directed to perform a continuous clean-up. All crates and cartons are to be broken down to a minimum volume before depositing in the dumpster. No burning will be permitted.

D. The Contractor shall use only cleaning materials and methods recommended by manufacturer of surface to be cleaned and shall provide assurance to the TPM that said material will not damage the finish of any work. Use cleaning materials only on surfaces recommended by cleaning material manufacturer. Contractor shall be responsible for assuring that affected employees are provided with, and required to use, all needed personal protective devices in connection with cleaning.

E. Cleaning of concrete and mortar equipment shall be performed at one location on site, designated by the TPM, by the Contractor. Spillage of fluid, concrete, or mortar to the ground or penetration of existing ground soil shall be prevented wherever possible. The Contractor shall remove from the site all residue or spillage from concrete equipment on a periodic basis as directed by the TPM.

F. All trucks leaving the site with earthen materials or loose debris shall be loaded in a manner that will prevent dropping of materials on roads, and, when necessary, shall have suitable coverings fastened over the load before leaving the site. Trucks bringing earthen materials over paved roads to the site shall be similarly loaded and covered. The Contractor shall conform to all local regulations regarding load limits and coverings.

G. If upon written notification, the Contractor fails, within 24 hours, to comply with the requirements of this Article, the TPM or Owner shall perform the necessary clean-up and deduct the cost of such work from the monies due or to become due Contractor on the following pay application. If a dispute arises with Contractor as to its responsibility for cleaning up, the TPM may clean up and charge the cost thereof to the Contractor as the TPM shall determine to be just and reasonable. The TPM's decision in such event shall be final and binding upon the Contractor.

H. Contractor shall provide and maintain daily, its own portable trash containers within the building confines.

I. Contractor shall be responsible to maintain its own office trailer, storage and work areas in a sanitary condition to minimize the hazard of attracting vermin and breeding insects. If the Contractor fails to comply, the TPM may do so and the cost thereof shall be charged to the Contractor. Extermination materials used shall be approved in writing in advance by the TPM.

J. Littering of trash by a Contractor's employee shall constitute adequate grounds for removal of that employee by the Contractor.

3.3. Final Cleaning

A. Contractor shall provide final cleaning of the Work, including all adjacent protection areas surface or unit of Work to normal "clean" condition expected for a first-class building cleaning and maintenance program. Contractor shall comply with manufacturer's instructions for cleaning operations. The following are examples, but not by way of limitation, of cleaning levels required:

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1. Removal of labels which are not required as permanent labels.
2. Cleaning of transparent materials, including mirror, window, and door glass, to polished condition. Remove substances which are noticeable as vision obscuring materials.
3. Replacing of broken glass and damaged transparent materials.01561 - 2
4. Cleaning of exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of dust, stains, films, and similar noticeable distracting substances.
5. Restoring of reflective surface to original reflective condition.
6. Wiping of surfaces of mechanical and electrical equipment clean, including elevator equipment.
7. Removal of excess lubrication and other substances.
8. Removal of debris and surface dust from limited access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.
9. Broom cleaning of concrete floors in non-occupied spaces.
10. Vacuum cleaning of carpeted surfaces and similar soft surfaces.
11. Cleaning of plumbing fixtures to sanitary condition, free of stains, including those resulting from water exposure.
12. Cleaning of equipment to condition of sanitation ready and acceptable for intended use.
13. Cleaning of light fixtures and lamps to function with full efficiency.
14. Cleaning of Project site, including landscape development areas, of litter and foreign substances.
15. Sweeping of paved areas to broom-clean condition. Remove stains, petro-chemical spills, and other foreign deposits.
16. Raking of grounds which are neither planted nor paved to smooth, even-textured surface.

B. Contractor shall remove waste materials from Project site daily and dispose of in a lawful manner.

C. Protection - Limiting Exposures: Contractor shall supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

D. Removal of Protection: Contractor shall remove temporary protection devices and facilities which were installed during course of the Work to protect previously completed Work during remainder of construction period.

END OF SECTION 01561

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SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Constructions Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals."

C. Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.

D. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section "Product Substitutions."

1.3. DEFINITIONS

A. Definitions used in this Section are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
    a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, which is current as of the date of the Contract Documents.
2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.4. SUBMITTALS

A. Product List Schedule: Prepare and submit a schedule showing products specified in a tabular form acceptable to the TPM and the Architect. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.

1. Coordinate the Product List Schedule with the Contractor's Construction Schedule

and the Schedule of Submittals.

2. Form: Prepare the product listing schedule with information on each item tabulated under the following column headings:
   a. Related Specification Section number.
   b. Generic name used in Contract Documents.
   c. Proprietary name, model number and similar designations.
   d. Manufacturer's name and address.
   e. Supplier's name and address.
   f. Installer's name and address.
   g. Projected delivery date, or time span of delivery period.

3. Initial Submittal: Within 30 days after Notice of Award, submit an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
   a. At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.

4. Completed Schedule: Within 60 days after Notice of Award, submit the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

5. Architect's Action: The Architect will respond through the TPM in writing to the Contractor within 2 weeks of receipt of the completed product list schedule. No response within this time period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. The Architect's response will include the following:
   a. A list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.5. QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a sole source.

   1. When specified products are available only from sources that do not or cannot produce a quantity adequate to complete project requirements in a timely manner, consult with the TPM for a determination of the most important product qualities before proceeding. Qualities may include attributes relating to visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources that produce products that possess these qualities, to the fullest extent possible.

B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

   1. Each Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other Contractors.
   2. If a dispute arises between Contractors over concurrently selectable, but incompatible products, the TPM will determine which products shall be retained and which are incompatible and must be replaced.

C. Nameplates:

1. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
   a. Name of product and manufacturer.
   b. Model and serial number.
   c. Capacity.
   d. Speed.
   e. Ratings.

1.6. PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials in a manner that will not endanger the supporting construction or workers.
7. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.
8. Storage areas will be established for each Contractor. All materials, equipment, tools, etc., must be returned to the designated areas at the end of each day unless prior approval has been received from the TPM. Materials not located in the designated areas at the end of each day are subject to disposal with all costs associated with the same being the Contractor's liability. Store and organize materials and equipment in an orderly manner as to consolidate and limit the storage area.

B. In the event the scope of Contractor's Work includes installation of materials or equipment furnished by TPM or others, it shall be the responsibility of Contractor to exercise proper care in handling, storing and installing such items. Contractor shall examine the items provided and report to TPM in writing any items it may discover that do not conform to requirements of the Contract Documents. Contractor shall not proceed to install nonconforming items without further instructions from TPM. Loss or damage due to acts or omissions of Contractor shall be deducted from any amounts due or to become

due Contractor.

PART 2 - PRODUCTS

2.1. PRODUCT SELECTION

A. General Product Requirements: Provide products that comply with the Contract Documents, which are undamaged and, unless otherwise indicated, unused at the time of installation.

1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:

1. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
   a. Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal" comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
2. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
3. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated.
   a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
5. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.
6. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.

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a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.

7. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern and texture from the product line selected.

PART 3 - EXECUTION

3.1. INSTALLATION OF PRODUCTS

A. All manufactured articles, material and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer, unless specified to the contrary in the Contract Documents. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

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SECTION 01631

PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

B. The Contractor's Schedule of Submittals are included under Division 1, Section "Submittals."

C. Standards: Refer to Division 1, Section "Definitions and Standards" for applicability of industry standards to products specified.

D. Procedural requirements governing the Contractor's selection of products and product options are included under Division 1, Section "Materials and Equipment."

E. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions. Procedures for Substitutions during bidding can be found in Division 0, Section 00100, titled Instructions to Bidders.

1.3. SUBMITTALS

A. Substitution Request Submittal: Requests for substitution will be considered only in case of product unavailability not as a result of the Contractor's performance. Request due to unavailability of product shall be accompanied by letters from each manufacturer specified substantiating unavailability of their product.

1. Submit each request for substitution for consideration in form and in accordance with procedures required for Change Order proposals.
2. Identify product, fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with requirements for substitutions, and following information, as appropriate:
   a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
   b. Samples, where applicable or requested.
   c. A detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
   d. Coordination information, including a list of changes or modifications needed for

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other parts of the Work and to construction performed by Owner and separate Contractors that will become necessary to accommodate proposed substitution.

e. A statement indicating substitution's effect on the Contractor's Construction Schedule. Indicate the effect of the proposed substitution on overall Contract Time.

f. Cost information, including a proposal of the net change, if any in Contract Sum.

g. Certification by Contractor that the substitution proposed is equal-to or better in every significant respect to that required by Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of failure of substitution to perform adequately.

3. Total Program Manager's Action: Within one week of receipt of request for substitution, the TPM will request additional information or documentation necessary for evaluation of the request. Within 2 weeks of receipt of request, or one week of receipt of additional information or documentation, whichever is later, TPM will notify the Contractor of acceptance or rejection of proposed substitution. Acceptance will be in form of a Change Order.

B. The Contractor's submittal and Total Program Manager's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 2 - EXECUTION

(Not Applicable)

END OF SECTION 01631

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SECTION 01650

STARTING OF SYSTEMS

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SECTION INCLUDES

A. Starting systems.

B. Demonstration and instructions.

C. Testing, adjusting, and balancing.

1.3. STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

1. Submit, for TPM, a proposed start-up schedule Forty-five (45) days in advance of start-up. Schedule shall show dates, hours, systems/equipment, and attendees.

B. Notify TPM seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions which may cause damage.

D. Verify that test, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

1. Start-up shall be performed just prior to Substantial Completion, but not before basic work is completed with only punch list items remaining.

F. Execute start-up under supervision of applicable Contractors' personnel in accordance with manufacturer's instructions.

1. Follow manufacturer's instruction about start-up of the equipment.

G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

I. Demonstration and instruction of kitchen, mechanical and electrical equipment shall be videotaped. Videos shall include voice explanations, visual and vocally explain the basic manufacturer's instructions for start-up and shut down of equipment. Videos shall be a submittal as requirement for project closeout process.

1.4. DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products of Owners personnel after date of Substantial Completion.

B. Demonstrate Project equipment, and instruct on site, Owners personnel by a qualified instructor who is knowledgeable about the Project and system.

1. Where specified in individual Specifications Section conduct instruction in a classroom environment.

C. For equipment or systems requiring seasonal operation, perform demonstration within six months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. All owner training will be video recorded for records and inclusion into the operations and maintenance manual.

1.5. TESTING, ADJUSTING, AND BALANCING

A. Contractor shall employ and pay for services of an independent firm to perform testing, adjusting, and balancing.

B. Reports will be submitted by the independent firm to the TPM and Engineer indicating observations and results of tests and indicating compliance or noncompliance with the requirements of the Contract Documents.

1.6. OWNER ORIENTATIONS

A. Provide technology systems user instructions for Owner's personnel who will occupy and use the system. The assigned technology systems procurement contracts shall require Vendor to provide a manufacturer's technical representative to conduct User classes for Owner's personnel. Contractor shall arrange and coordinate this orientation.

B. Schedule, with TPMS approval, and conduct five orientation walk throughs of the Project for Owner s personnel. These walk throughs, which will not exceed two hours in duration, shall be held just prior to occupancy or Substantial Completion whichever comes first.

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PART 2 - MATERIALS
Not Applicable

PART 3 - EXECUTION
Not Applicable

END OF SECTION 01650

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SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures
2. Project record document submittal
3. Operating and maintenance manual submittal
4. Submittal of warranties
5. Final cleaning

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

1.3. SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for Certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
   a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
2. Advise TPM & Owner of pending insurance change-over requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
6. Deliver tools, spare parts, extra stock, and similar items.
7. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.
8. Complete start-up testing of systems, and instruction of the Owner's operating and

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maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

9. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Total Program Manager will either proceed with inspection or advise the Contractor of unfilled requirements. The Total Program Manager will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Total Program Manager will repeat inspection when requested and assured that the Work has been substantially completed.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4. FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Price.
3. Submit a certified copy of the Total Program Manager's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and the list has been endorsed and dated by the Total Program Manager.
4. Submit consent of surety to final payment.
5. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Re-inspection Procedure: The Total Program Manager will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Total Program Manager.

1. Upon completion of re-inspection, the Total Program Manager and Owner will prepare a certificate of final acceptance or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
2. If necessary, re-inspection will be repeated.

1.5. RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Total Program Manager's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where

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the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
2. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.
3. Note related Change Order numbers where applicable.
4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Total Program Manager for the Owner's records.

D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data to the Total Program Manager for the Owner's records.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Total Program Manager and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Total Program Manager for the Owner's records.

G. Maintenance Manuals: Organize operating and maintenance data into electronic format consistent with TPM document management system as specified in the contract. Preferred PDF portfolio that properly indexes data. Include the following types of

information.

1. Emergency instructions
2. Spare parts list
3. Copies of warranties
4. Wiring diagrams
5. Recommended "turn around" cycles
6. Inspection procedures
7. Shop Drawings and Product Data
8. Fixture lamping schedule

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.1. CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance manuals
2. Record documents
3. Spare parts and materials.
4. Tools
5. Lubricants
6. Fuels
7. Identification systems
8. Control sequences.
9. Hazards
10. Cleaning
11. Maintenance agreements and similar continuing commitments

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Start-up
2. Shutdown
3. Emergency operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments
7. Effective energy utilization

3.2. FINAL CLEANING

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A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
    a. Remove labels that are not permanent labels.
    b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
    c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
    d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing, kitchen, etc. fixtures to a sanitary condition. Clean light fixtures and lamps.
    e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01700

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SECTION 01730

OPERATIONS AND MAINTENANCE DATA

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section includes the following:

1. Format and content of manuals.
2. Schedule of Submittals.

1.3. RELATED SECTIONS

A. Section 01300 - Submittals: Submittals procedures.

B. Section 01400 - Quality Control Services. Test and Balance reports.

C. Section 01700 - Contract Closeout: Contract closeout procedures.

1.4. QUALITY ASSURANCE

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.5. FORMAT

A. Prepare data in the form of a PDF portfolio for the Operations and Maintenance Manual.

B. Provide properly labeled indexed for each separate product and system. Each section will include a description of product and major component parts of equipment and include Manufacturers printed data sheet.

C. Drawings:

1. Provide PDF of sketches and small drawings to include in manual as a separate document.

D. Contents: The first document in the PDF portfolio should include a Table of Contents listing each product or system contained in the portfolio. There shall be three main sections within the O&M manual described as described below. Each section should be preceded by a separate document listing the section and its contents as described below and will be bookmarked in the PDF so it can be easily found.

1. Part 1: Directory, listing names, addresses, and telephone numbers of TPM, Architect, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided

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by Specification Section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

a. Significant design criteria.
b. List of equipment.
c. Parts list for each component.
d. Operating instructions.
e. Maintenance instructions for equipment and systems.
f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:

a. Shop drawings and product data.
b. Air and water balance reports.
c. Certificates.

1.6. CONTENTS, EACH VOLUME

A. Table of Contents: Provide title of Project; names, addresses, and telephone number of TPM, Architect, Sub consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

E. Typed Text: Are required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.7. MANUAL FOR MATERIALS AND FINISHES

A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.

B. Instructions for Care Maintenance: Include manufacturers recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: As specified in individual Product Specification Sections.

E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for

insertion of data.

F. The O&M Manual will include all of that O&M data referenced or addressed in divisions 1-33.

1.8. MANUAL FOR EQUIPMENT AND SYSTEMS

A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

B. Panel board Circuit Directories: Provide electrical service characteristics, controls, and communications; typed or by label machine.

C. Include color-coded wiring diagrams as installed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include summer, winter, and any special operation instructions. Include regulation, controls, stopping, shut down and emergency instructions.

E. Maintenance Requirements: Include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instruction.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturers printed operation and maintenance instructions.

H. Include Sequence of Operation by controls manufacturer.

I. Provide original manufacturers parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Provide Contractors coordination drawings with color-coded piping diagrams as installed.

L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Provide list of original manufacturers spare parts, current prices, and recommended quantities to be maintained in storage.

N. Include test and balancing reports.

O. Additional Requirements: As specified in individual Product Specification Sections.

P. Provide a listing in Table of Contents for design data, with tabbed indexed and space for insertion of data.

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1.9. SUBMITTALS

A. Submit an electronic copy of preliminary draft or proposed formats and outlines of contents within 120 days of the Notice of Award. TPM will review draft and return a copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten (10) days after acceptance.

C. Submit one copy of completed PDF portfolio 45 days prior to Substantial Completion. This copy will be reviewed and returned (after final inspection), with TPM and/or Architects comments. Revise content of all document sets as required prior to final submission.

D. Submit final PDF Portfolio in final form within ten days after final inspection. Final release of retainage by TPM is contingent, among other things, upon receipt and approval by the Architect and TPM of all O&M manuals due the Owner by the Contractor. Final payment will not be made until such time as all manuals have been submitted and approved.

PART 2 - MATERIALS
Not Applicable

PART 3 - EXECUTION
Not Applicable

END OF SECTION 01730

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SECTION 01740

WARRANTIES

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. Drawings, the Contract for Construction Services and other Divisions 0 & 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1. Refer to specific Specifications Sections for the duration special warranties.
2. General closeout requirements are included in Section "Project Closeout."
3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products.

C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

1.3. DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are required by the Contract Documents, either to extend time limits provided by Article 2, Section 2.16 of the Contract for Construction Services or to provide greater rights for the Owner.

1.4. WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work to accepted condition to comply with the requirements of the Contract Documents.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: The warranties contained in the Contract for Construction Services or specification sections are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.5. SUBMITTALS

A. Forms for special warranties will be provided at a later date. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and subcontractor, supplier or manufacturer. Submit a draft to the Owner through the Total Program Manager for approval prior to final execution.

1. Refer to individual Sections of Divisions-1 through 33 for specific content requirements, and particular requirements for submittal of special warranties.

B. Form of Submittal: At Final Completion compile three copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual. Warranties are to include:

1. Name of the project
2. Item under warranty
3. Start date of warranty
4. Duration of warranty
5. Manufacturer or subcontractor providing the warranty including phone number for warranty issues
6. Subcontractor that installed the product or system including phone number
7. Signatures by appropriate parties authorized to issue warranty

C. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the 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 the installer.
2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES”, the Project title or name, and the name of the Contractor.

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3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION

3.1. SCHEDULE OF WARRANTIES

A. Schedule: Provide warranties on products and installations as specified in the various specification sections.

3.2. PERFORMANCE OF WARRANTY WORK

A. Completing and Correcting Work After giving forty-eight (48) hours written notice to Contractor or immediately after verbal and/or written notification of a warranty failure, TPM may complete or correct any part of the Contract Work which Contractor has neglected or shown itself otherwise unable to expeditiously complete or correct and deduct the cost of doing so from Contractor's payments or back charge the Contractor for same.

3.3. INSTALLERS WARRANTY

A. Provide Installers warranty per Specification Section 01460 Roofing warranty.

END OF SECTION 01740

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SECTION 018130

SUSTAINABLE DESIGN REQUIREMENTS

1.1. SUMMARY

A. Requirements are based on the green building initiative's "Green Globes Nc (New Construction) certification program version 1.5.

B. Project requirements:

1. Site: reduce air and water pollution, and control sediment discharge during construction through the application of the erosion and control plan included as part of the civil engineering construction documents. The plan is to be maintained, monitored, and documented throughout the project.
2. Waste management: divert a minimum of 25% of construction waste from landfills, calculated by weight. Excavated soil and land-clearing debris do not count as construction waste.
   a. Contractor to develop and submit a waste management plan outlining.
      1) Materials to be diverted / recycled.
      2) Methods of capturing and or separating the materials to be diverted.
      3) Methods of educating and ensuring the plan is implemented (worker training, oversight, etc.)
3. Indoor air quality during construction:
   a. Meet or exceed the recommended control measures of the SMACNA IAQ guidelines for occupied buildings under construction, 2nd ed.
   b. Protect stored on-site and installed absorptive materials from moisture damage.
   c. If permanently installed air handlers are used during construction, filtration media with a MERV of 8 must be used at each return air grille, as determined by ASHRAE standard 52.2-1999. Replace all filtration media immediately prior to occupancy.
4. Materials for building core and shell and interior fit-out: at least 25%, based on cost, of the products used will have one of the following types of certifications:
   a. environmental product declarations (EPDS)
      1) Industry wide
      2) Brand specific
   b. Third-party certifications based upon a multiple attribute standard.
      1) NSF sustainability assessment standards
      2) UL environment sustainability standards
      3) Other recognized standard
   c. Third-party verified product life cycle assessment based on iso 14040 and 14044.
5. Low-emitting materials:
   a. Use of low v-o-c materials: utilize low emitting adhesives, sealants, paints, and wood products complying with the following VOC content limits:
      1) Carpet adhesives: 50 g/l.
      2) Carpet pad adhesives: 50 g/l.

3) Wood flooring adhesive: 100 g/l.
4) Rubber floor adhesives: 60 g/l.
5) Subfloor adhesives: 50 g/l.
6) Ceramic tile adhesives: 65 g/l.
7) VCT and asphalt tile adhesives: 50 g/l.
8) Gypsum board and panel adhesives: 50 g/l.
9) Cove base adhesives: 50 g/l.
10) Multipurpose construction adhesives: 70 g/l.
11) Structural glazing adhesives: 100 g/l.
12) Single-ply roof membrane adhesive: 250 g/l.
13) Metal-to-metal adhesives: 30 g/l.
14) Plastic foam adhesives: 50 g/l.
15) Adhesives for porous materials (except wood): 50 g/l.
16) Wood glues: 30 g/l.
17) Fiberglass adhesives: 80 g/l.
18) PVC welding compounds: 510 g/l.
19) CPVC welding compounds: 490 g/l.
20) ABS welding compounds: 325 g/l.
21) Plastic cement welding compounds: 250 g/l.
22) Adhesive primer for plastic: 550 g/l.
23) Contact adhesive: 80 g/l.
24) Special-purpose contact adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/l.
25) Architectural sealants: 250 g/l.
26) Nonmembrane roof sealants: 300 g/l.
27) Single-ply roof membrane sealants: 450 g/l.
28) Other sealants: 420 g/l.

b. Carpet and under carpet adhesives shall comply with CRI's green label plus testing program.

c. Paints: for field applications inside the building, wall paints shall comply with the following VOC content limits:
   1) Latex flat paints: 50 g/l.
   2) Latex non-flat paints: 150 g/l.

d. Paints, adhesives, and other materials should comply with VOC limits listed above or have third party certification from one of the following applicable programs:
   1) Ecologo (paints & adhesives)
   2) Green seal (paints & adhesives)
   3) Greenguard children & schools
   4) Indoor advantage gold – scientific certification systems

1.2. SUBMITTALS

A. Project materials cost data (for tracking of GGNC sections 3.5.1.2 and 3.5.2.2 utilizing environmental product declarations (EPD)):

1. Provide statement indicating total cost for materials used for project. Costs exclude labor, overhead, and profit.

a. Statement to include breakdown of costs for materials as outlined and identified in specification sections under each division (ex. Div 3 should breakdown into costs for each section listed.)

b. Where a specification section contains and identifies more than one product, material and/or accessory which are covered under separate EPDS, provide further breakdown of material cost per product or line of material (ex. Each paint type, each carpet line, each ceiling tile type).

c. Reference 018130A Project Material Cost Data Breakdown Example

d. Reference 018130B Green Globes Materials Submittal Form

B. Action Plans: Submit Within 30 Days of Date Established for The Notice to Proceed:

1. Erosion and sedimentation control plan in accordance with the NPDES general permit and FDEP regulations.
2. Waste management plan designed to divert 25% of construction waste from landfills, by weight.
3. construction indoor-air-quality management plan based on SMACNA's indoor air quality guidelines for occupied buildings under construction, 1995, chapter 3.

C. Progress reports: with each application for payment, submit up to date reports of the following:

1. Photographs with descriptive narrative, complying with the erosion and sedimentation control plan.
2. Waste management calculations as defined in section 01719: total weight of waste material, weight sent to landfill, weight sent to recycling center, percent recycled material compared to total waste material.
3. Photographs with descriptive narrative, complying with SMACNA's indoor air quality guidelines.

D. Documentation submittals: product data, certificates or other compliance data provided by the manufacturer. Product data shall be submitted with all other general submittals.

1. Environmental product declarations (EPDS) or other third-party certification as outlined above.
2. Adhesives and sealants: manufacturer supplied data of VOC content of all adhesives, sealants, and primers applied within the building.
3. paints and coatings: manufacturer supplied data of VOC content of all paints, coatings, primers, finishes, stains, sealers, and shellacs applied within the building.
4. Carpet and carpet cushions: manufacturer supplied data of compliance with carpet and rug institute's green label plus program for all carpet and carpet cushion installed within the building.
5. Wood: manufacturer supplied data indicating no added urea-formaldehyde resins.

1.3. QUALITY ASSURANCE

A. Project sustainability coordinator: appoint a project sustainability coordinator familiar with sustainability practices in general, and the green globes rating system in particular, to

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manage the collection and submission of documentation to the architect.

END OF SECTION 018130

OCSD Construction Program VI

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CONSTRUCTION PACKAGE 635C

DESTIN ELEMENTARY SCHOOL
3/4/5 CENTER

Okaloosa County School District
School Construction Program VI

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DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER

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SECTION 014535 - STRUCTURAL INSPECTION PLAN

PART 1

1.01 SCOPE OF WORK

THIS PLAN DESCRIBES WORK REQUIRED TO COMPLY WITH THE THRESHOLD LAW; CHAPTER 553 OF THE FLORIDA STATUTES. THE OWNER SHALL RETAIN A QUALIFIED SPECIAL INSPECTOR TO PERFORM THE WORK DESCRIBED HEREIN. PROPOSALS FOR SPECIAL INSPECTION SERVICES SHALL BE SEPARATE AND INDEPENDENT FROM ALL OTHER PROPOSALS FOR MATERIALS TESTING AND OTHER QUALITY ASSURANCE SERVICES. THE SPECIAL INSPECTOR SHALL VERIFY THAT THE PRIMARY STRUCTURAL FRAME (ALL THOSE MEMBERS WHICH TRANSMIT LOADS TO THE GROUND) IS CONSTRUCTED IN SUBSTANTIAL ACCORDANCE WITH THE PERMITTED OFFICIAL CONTRACT DOCUMENTS, EXCEPT AS VARIATIONS THERE FROM ARE PERMITTED IN WRITING BY THE STRUCTURAL ENGINEER OF RECORD. THIS PLAN MAY BE SUPPLEMENTED BY ADDITIONAL REQUIREMENTS OF THE MUNICIPALITY OR BY THE OWNER AS DEEMED NECESSARY DURING THE COURSE OF THE WORK. THE OFFICIAL CONTRACT DOCUMENTS ARE DEFINED AS THE PERMITTED PLANS, RECORDED ADDENDA, PROJECT SPECIFICATIONS, AMENDMENTS AND THE STRUCTURAL INSPECTION PLAN.

1.02 QUALIFICATIONS OF THE SPECIAL INSPECTOR

A. THE SPECIAL INSPECTOR SHALL BE A FLORIDA REGISTERED ENGINEER EXPERIENCED IN STRUCTURAL ENGINEERING AND CERTIFIED AS REQUIRED BY CURRENT LEGISLATION. THE SPECIAL INSPECTOR MAY SEND A FULL-TIME EMPLOYEE AS HIS AUTHORIZED REPRESENTATIVE TO THE PROJECT, BUT THAT PERSON SHALL BE EXPERIENCED AND KNOWLEDGEABLE IN THE STRUCTURAL SYSTEMS BEING USED AND THE APPROPRIATE PORTIONS OF THE GOVERNING CODES AND STANDARDS.

B. THE SPECIAL INSPECTOR SHALL HAVE A MINIMUM OF SEVEN (7) YEARS OF EXPERIENCE IN DESIGN AND INSPECTION OF SIMILAR STRUCTURES. THE SPECIAL INSPECTOR'S REPRESENTATIVE SHALL HAVE A MINIMUM OF THREE (3) YEARS OF EXPERIENCE IN INSPECTION OF SIMILAR STRUCTURES. RESUMES OF BOTH THE SPECIAL INSPECTOR AND SPECIAL INSPECTOR'S REPRESENTATIVE SHALL BE SUBMITTED TO THE OWNER'S REPRESENTATIVE, THE ENFORCING AGENCY HAVING JURISDICTION AND THE STRUCTURAL ENGINEER OF RECORD FOR REVIEW AND ACCEPTANCE. AS USED HEREIN THE TERM SPECIAL INSPECTOR INCLUDES THE AUTHORIZED REPRESENTATIVE, UNLESS OTHERWISE INDICATED. INSOFAR AS POSSIBLE, THE SPECIAL INSPECTOR SHALL NOT BE CHANGED THROUGHOUT THE DURATION TO THE PROJECT.

1.03 RESPONSIBILITIES AND LIMITATIONS OF THE SPECIAL INSPECTOR

A. THE SPECIAL INSPECTOR IS RESPONSIBLE TO THE ENFORCING AGENCY

HAVING JURISDICTION FOR THIS PROJECT. THE PRESENCE OF THE SPECIAL INSPECTOR DOES NOT RELIEVE THE ENFORCING AGENCY, THE ARCHITECT OR THE STRUCTURAL ENGINEER OF RECORD OF THEIR RESPONSIBILITIES.

B. PRIOR TO STARTING WITH THE WORK, THE SPECIAL INSPECTOR AND THE AUTHORIZED REPRESENTATIVE SHALL BECOME FAMILIAR WITH THE SPECIFIC STRUCTURAL COMPONENTS AND SYSTEMS WHICH THE SPECIAL INSPECTOR

WILL BE RESPONSIBLE FOR INSPECTING. HE IS RESPONSIBLE FOR A THOROUGH KNOWLEDGE OF THE INTENT AND CONTENT OF THE CONTRACT DOCUMENTS AND ACCEPTED SUBMITTALS RELATING TO HIS INSPECTION RESPONSIBILITIES, APPROPRIATE PORTIONS OF THE GOVERNING CODES, AND THE EXERCISE OF GOOD JUDGMENT.

C. THE SPECIAL INSPECTOR SHALL THEN PROVIDE A CERTIFIED AFFIDAVIT TO THE OWNER AND STRUCTURAL ENGINEER OF RECORD ATTESTING TO THE FOLLOWING:

1. HE HAS REVIEWED THE CONTRACT DOCUMENTS AND UNDERSTANDS THEIR CONTENT AND THE CONCEPT CONVEYED THEREIN.

2. HE HAS READ THE STRUCTURAL INSPECTION PLAN, UNDERSTANDS ITS INTENT AND INTENDS TO COMPLY WITH ITS REQUIREMENTS.

D. THE SPECIAL INSPECTOR IS RESPONSIBLE FOR OBSERVING THE CONSTRUCTION OF THE PRIMARY STRUCTURAL COMPONENTS AND REPORTING TO THE CONCERNED PARTIES THAT THOSE PORTIONS OF THE STRUCTURE ARE BEING BUILT IN GENERAL CONFORMANCE WITH THE STRUCTURAL DOCUMENTS, AND IF NOT, THE LOCATION AND DESCRIPTIONS OF THOSE VARIATIONS.

E. THE SPECIAL INSPECTOR IS NOT TO MAKE DESIGN DECISIONS OR INTERPRETATION OF THE CONTRACT DOCUMENTS.

F. THE SPECIAL INSPECTOR SHALL COOPERATE WITH THE CONTRACTOR BUT SHALL NOT DIRECT THE CONTRACTOR'S WORK NOR BE RESPONSIBLE FOR CONSTRUCTION MEANS AND METHODS.

1.04 REPORTING

A. THE SPECIAL INSPECTOR SHALL MAINTAIN A RECORD OF THE PROGRESS, WORKING CONDITIONS, OBSERVATIONS, TESTING, ANY REQUIRED ACTION BY THE CONTRACTOR, AND DEVIATIONS FROM THE OFFICIAL CONTRACT DOCUMENTS. SUCH RECORDS ARE TO BE KEPT BY THE SPECIAL INSPECTOR FOR A MINIMUM OF 3 YEARS AFTER COMPLETION OF THE PROJECT.

B. IT IS THE DUTY OF THE SPECIAL INSPECTOR TO IMMEDIATELY NOTIFY THE CONTRACTOR IN PERSON, AND THE ARCHITECT AND STRUCTURAL

ENGINEER OF RECORD BY TELEPHONE, OF THE FOLLOWING:

1. THE USE OF MATERIALS, TESTS, EQUIPMENT, WORKMANSHIP OR CONSTRUCTION NOT CONFORMING TO THE OFFICIAL CONTRACT DOCUMENTS.

2. CONSTRUCTION PERFORMED WITHOUT INSPECTION AND NOT CAPABLE OF BEING INSPECTED OR TESTED IN PLACE.

THESE EXCEPTIONS SHALL THEN BE ISSUED IN WRITING IMMEDIATELY TO THOSE LISTED ABOVE AND ATTACHED TO THE DAILY FIELD REPORTS.

C. THE SPECIAL INSPECTOR SHALL KEEP AN EXCEPTION FILE FOR FOLLOW-UP. THIS FILE SHALL BE REVIEWED ON A DAILY BASIS AND UPDATED AS EXCEPTIONS ARE RECTIFIED. ANY UNCORRECTED EXCEPTIONS SHALL BE REPORTED AT AN APPROPRIATE TIME, USING A NON-COMPLIANCE NOTICE, TO THE CONTRACTOR, ENFORCING AGENCY, OWNER'S REPRESENTATIVE AND ARCHITECT/ENGINEER.

D. THE SPECIAL INSPECTOR SHALL WRITE AND SIGN A REPORT EACH DAY AN INSPECTION IS MADE. THE REPORT SHALL CONSIST OF THE FOLLOWING:

1. IDENTIFY NAME AND LOCATION OF PROJECT, NAME OF SPECIAL INSPECTOR AND SPECIAL INSPECTOR REPRESENTATIVE, PERMIT NUMBER, DATE, WORKING CONDITIONS INCLUDING WEATHER AND TEMPERATURE, AND TYPE AND LOCATION OF WORK BEING PERFORMED.

2. A DETAILED REPORT OF EACH INSPECTION, INCLUDING THE PRESENCE AND ACTIVITIES OF THE TESTING AGENCY. NOTE CHANGES IN WORKING SEQUENCE OR MATERIALS AND ANY UNUSUAL CIRCUMSTANCES AFFECTING THE PERFORMANCE OF WORK. PLACE EMPHASIS ON THOSE AREAS WHERE DEFICIENCIES RECUR.

3. REVIEW AND COMMENT ON THE MATERIALS TESTING REPORTS PRIOR TO THAT DAY'S INSPECTION.

E. THE REPORT WILL BE SUPPLEMENTED WITH THE FOLLOWING, WHEN APPLICABLE:

1. SPECIAL RECORDS (WELD TESTS, WELDERS CERTIFICATES, CONCRETE TESTS, ETC.).

2. INSPECTION REPORTS OF THE SHORING AND RE-SHORING ENGINEER.

3. INSPECTION REPORTS OF THE GEOTECHNICAL ENGINEER.

4. DOCUMENTATION OF CHANGES MADE IN THE FIELD.

5. PHOTOGRAPHS.

F. DAILY FIELD REPORTS SHALL BE SUBMITTED ON A WEEKLY BASIS TO THE ENFORCING AGENCY, OWNER'S REPRESENTATIVE, ARCHITECT AND STRUCTURAL ENGINEER OF RECORD, UNDER A COVER LETTER SIGNED AND SEALED BY THE SPECIAL INSPECTOR.

G. AN INSPECTION LOG SUMMARIZING ALL INSPECTIONS SHALL BE POSTED AT THE JOBSITE AND FILLED OUT EACH DAY AN INSPECTION IS MADE. IT SHALL CONTAIN, AS A MINIMUM: PROJECT NAME, LOCATION, PERMIT NUMBER, SPECIAL INSPECTOR'S NAME, OWNER, CONTRACTOR, DATE OF INSPECTION, CONSTRUCTION PHASE, WORK DESCRIPTION, COMMENTS, APPROVED OR REJECTED AND BE SIGNED BY THE SPECIAL INSPECTOR.

H. UPON COMPLETION OF THE BUILDING AND PRIOR TO THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY, THE SPECIAL INSPECTOR SHALL SUBMIT TO THE ENFORCING AGENCY, OWNER, ARCHITECT AND STRUCTURAL ENGINEER OF RECORD A SIGNED AND SEALED STATEMENT STATING THAT THE PART OF THE PROJECT UNDER HIS INSPECTION RESPONSIBILITIES HAS BEEN CONSTRUCTED IN SUBSTANTIAL ACCORDANCE WITH THE OFFICIAL CONTRACT DOCUMENTS. THIS STATEMENT SHALL BE IN ACCORDANCE WITH SECTION 553.79(7)A OF THE FLORIDA STATUTES.

1.05 CONTRACTOR REQUIREMENTS

A. THE CONTRACTOR SHALL COOPERATE WITH AND ASSIST THE SPECIAL INSPECTOR IN PERFORMING HIS INSPECTION DUTIES AS SPECIFIED HEREIN. THE SPECIAL INSPECTOR SHALL HAVE FREE ACCESS TO THE PROJECT AT ALL TIMES.

B. THE CONTRACTOR SHALL ADVISE THE SPECIAL INSPECTOR, IN ADVANCE, OF CONSTRUCTION SCHEDULES AND PLANNED OPERATIONS IN ORDER TO ASSURE TIMELY AND APPROPRIATE OBSERVATION AND INSPECTION OF ITEMS SPECIFIED HEREIN. THE MINIMUM NOTICE GIVEN THE SPECIAL INSPECTOR SHALL BE 24 HOURS PRIOR TO THE TIME OF THE INSPECTION. FURTHER, THE SCHEDULED INSPECTION TIME FOR REINFORCING STEEL SHALL BE NOT LESS THAN ONE HOUR PRIOR TO THE SCHEDULED CONCRETE PLACEMENT.

C. THE CONTRACTOR SHALL FURNISH IN A TIMELY MANNER TO THE SPECIAL INSPECTOR, COPIES OF ALL REVIEWED AND ACCEPTED SUBMITTALS (EXCLUDING CALCULATIONS) FOR THE STRUCTURAL ELEMENTS OF THE PROJECT.

D. SPECIAL INSPECTIONS DO NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO COMPLY WITH THE CONTRACT DOCUMENTS, ANY STATUTORY OR CONTRACTUAL OBLIGATIONS, NOR HIS RESPONSIBILITIES TO CARRY OUT HIS QUALITY CONTROL INSPECTIONS AND TESTING. THE CONTRACTOR HAS THE SOLE RESPONSIBILITY FOR ANY DEVIATIONS FROM

THE OFFICIAL CONTRACT DOCUMENTS AND THE COSTS OF RECTIFYING THOSE DEVIATIONS.

E. WORK WHICH IS IN NON-COMPLIANCE WITH THE OFFICIAL CONTRACT DOCUMENTS MAY BE CORRECTED BY THE CONTRACTOR OR THE CONTRACTOR MAY SUBMIT TO THE ARCHITECT/ENGINEER A REQUEST FOR ACCEPTANCE OF THE DEVIATION.

F. CONSTRUCTION PERFORMED WITHOUT INSPECTION AND THAT IS UNABLE TO BE INSPECTED MAY REQUIRE TESTING OR REMOVAL AS DETERMINED BY THE STRUCTURAL ENGINEER OF RECORD.

G. THE SPECIAL INSPECTOR CAN NOT MAKE THE REQUIRED COMPLETION STATEMENT AND THE BUILDING WILL NOT RECEIVE A CERTIFICATE OF OCCUPANCY IF WORK IS NOT IN SUBSTANTIAL ACCORDANCE WITH THE OFFICIAL CONTRACT DOCUMENTS, OR IF CONSTRUCTION IS PERFORMED WITHOUT INSPECTION AND IS UNABLE TO BE INSPECTED.

H. INSTALLATION OF ALL SHORING AND RE-SHORING SHALL BE IN ACCORDANCE WITH THE SIGNED AND SEALED SHORING AND RE-SHORING DRAWINGS PREPARED BY THE DELEGATED SHORING ENGINEER. (SEE STRUCTURAL NOTES FOR COMPLETE REQUIREMENTS). THE DELEGATED SHORING ENGINEER OR HIS AUTHORIZED REPRESENTATIVE SHALL INSPECT AND ENSURE THAT THE DRAWING REQUIREMENTS AND SPECIFICATIONS ARE ADHERED TO, AND PROVIDE HIS WRITTEN REPORT TO THE SPECIAL INSPECTOR PRIOR TO ALL CONCRETE POURS. THE SPECIAL INSPECTOR IS TO VERIFY THAT THE INSPECTION IS PERFORMED AND IS TO OBSERVE THAT THE WORK APPEARS TO BE IN COMPLIANCE WITH THE DRAWINGS.

1.06 REQUIREMENTS OF THE OWNER

A. THE OWNER SHALL ARRANGE FOR ALL NECESSARY CONTRACT DOCUMENTS, INCLUDING TWO COMPLETE SETS OF ARCHITECTURAL AND STRUCTURAL DOCUMENTS FOR THE PROJECT, INCLUDING ALL DRAWINGS AND SPECIFICATIONS, THE GEOTECHNICAL REPORT AND MATERIALS TEST REPORTS, TO BE FURNISHED TO THE SPECIAL INSPECTOR DURING THE PROGRESS OF THE WORK IN A TIMELY MANNER. PROVIDE THE SPECIAL INSPECTOR WITH TWO COPIES OF ALL STRUCTURAL CHANGES, REVISIONS, ADDENDA, ETC.

B. THE OWNER SHALL ENSURE THAT THE CONTRACTOR PROVIDES TO THE ENFORCING AGENCY, ARCHITECT, STRUCTURAL ENGINEER OF RECORD AND THE SPECIAL INSPECTOR A SHORING AND RE-SHORING PLAN WHICH IS SIGNED AND SEALED BY A DELEGATED ENGINEER REGISTERED IN THE STATE OF FLORIDA.

C. THE OWNER SHALL ENSURE THAT A QUALIFIED TESTING AGENCY IS RETAINED. SEE CONTRACT DOCUMENTS FOR REQUIREMENTS.

D. THE OWNER SHALL ENSURE THAT A GEOTECHNICAL CONSULTANT IS RETAINED TO CONFIRM THAT THE SPECIFIED FOUNDATION PREPARATION IS PERFORMED.

PART II

2.01 GENERAL

THE FOLLOWING IS A GENERAL INSPECTION PLAN DESCRIBING WORK TO BE PERFORMED BY THE SPECIAL INSPECTOR. THE INTENT IS TO DESCRIBE MINIMUM LEVELS NECESSARY TO CONFIRM THAT WORK COMPLIES WITH THE DESIGN DOCUMENTS. THE FOLLOWING ARE NOT INSPECTOR CHECK LISTS BUT POINT OUT SOME CRITICAL AREAS REQUIRING SPECIFIC ATTENTION BY THE SPECIAL INSPECTOR.

2.02 FOUNDATIONS

A. SHALLOW FOUNDATIONS:

1. THE GEOTECHNICAL CONSULTANT RETAINED BY THE OWNER WILL INSPECT SHALLOW FOUNDATIONS AND ALL FOOTING AREAS TO CONFIRM THAT SPECIFIED DESIGN SOIL CAPACITIES ARE MET. THE GEOTECHNICAL CONSULTANT WILL FURNISH THE SPECIAL INSPECTOR WITH DAILY REPORTS AS WELL AS A SUMMARY REPORT, SIGNED AND SEALED BY A FLORIDA P.E., STATING THAT THE FOUNDATION PREPARATION WAS COMPLETED ACCURATELY AND COMPLETELY SO AS TO ALLOW THE FOUNDATION TO FUNCTION AS INTENDED.

2, THE TESTING AGENCY RETAINED BY THE OWNER WILL MONITOR AND TEST BACKFILL AND COMPACTION OPERATIONS. THE TESTING AGENCY WILL SUBMIT A COPY OF REPORTS ON THESE OPERATIONS TO THE SPECIAL INSPECTOR, SIGNED AND SEALED BY A FLORIDA P.E.

B. FOOTINGS:

1. REVIEW CONFIGURATION AND PLACEMENT OF REINFORCEMENT FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS. OBSERVE THAT CLEARANCES ARE PROPERLY MAINTAINED.

2. REVIEW DOWEL AND LAP SPLICE LENGTHS FOR COMPLANCE WITH THE CONTRACT DOCUMENTS.

3. OBSERVE CONCRETE PLACEMENT AS OUTLINED IN THE CAST-IN-PLACE CONCRETE SECTION OF THIS INSPECTION PLAN.

2.03 CAST-IN-PLACE CONCRETE

A. THE CONTRACTOR IS TO NOTIFY THE SPECIAL INSPECTOR A MINIMUM OF 24 HOURS PRIOR TO THE PLACEMENT OF ANY STRUCTURAL CONCRETE.

B. REINFORCING STEEL:

1. USING THE STRUCTURAL DRAWINGS, INSPECT GRADE, SIZE, QUANTITY, CONFIGURATION AND SPACING OF REINFORCING FOR COMPLIANCE WITH THE STRUCTURAL DRAWINGS SUPPLEMENTED WITH SHOP DRAWINGS. PRIOR TO CONCRETE PLACEMENT REPORT ANY NOTED CONFLICT AND CONFIRM THAT CORRECTIONS ARE MADE BEFORE CONCRETE IS POURED.

2. CHECK MINIMUM CLEARANCE REQUIREMENTS FROM CONCRETE SURFACES.

3. CHECK THAT REINFORCING IS ADEQUATELY SUPPORTED AND TIED TO RESIST DISPLACEMENT OR SHIFTING DURING POUR.

4. CHECK THAT REBAR SURFACES ARE FREE OF EXCESS RUST OR OTHER COATINGS THAT MAY ADVERSELY AFFECT BONDING CAPACITY. IF OILING OF FORMS IS REQUIRED, CHECK THAT IT IS APPLIED BEFORE REINFORCING IS PLACED.

5. CHECK SPLICE LOCATIONS AND REQUIRED LENGTH OF LAP. CHECK THAT THE ACCEPTED MECHANICAL COUPLERS ARE PROPERLY INSTALLED PER MANUFACTURER'S SPECIFICATIONS. REPORT ANY DEVIATIONS FROM THE CONTRACT DOCUMENTS BEFORE CONCRETE IS CAST AND CONFIRM THAT CORRECTIONS ARE MADE.

6. CHECK INSTALLATION OF HOODED BARS FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS.

2.04 STRUCTURAL STEEL

A. INSPECT STRUCTURAL STEEL PRIOR TO CONCEALMENT TO VERIFY GRADE, SIZES, CONNECTIONS, STRAIGHTNESS AND FINISH. CHECK WITH CONTRACT DOCUMENTS AND SHOP DRAWINGS.

B. INSPECT SETTING OF ANCHOR BOLTS, EMBEDS AND OTHER MISCELLANEOUS STRUCTURAL ITEMS PRIOR TO CONCRETING. VERIFY SIZE, QUANTITY AND FINISH.

C. INSPECT SHEAR STUDS UPON COMPLETION OF WELDING STUDS TO NEW BEAM SYSTEM.

D. INSPECT CONNECTIONS FOR THE FOLLOWING:

1. BOLTED CONNECTIONS: TYPE, SIZE AND NUMBER OF BOLTS. CHECK THAT BOLTS ARE CLEAN AND LUBRICATED AND HAVE PROPER WASHERS AND THAT THEY CONFORM TO THE SPECIFICATIONS.

CHECK THAT BOLT HOLES ARE THE SPECIFIED TYPE AND SIZE. VERIFY THAT BOLTS ARE PROPERLY TIGHTENED. FOR SLIP-CRITICAL BOLTS WITH LOAD INDICATOR WASHERS, CHECK ALL BOLTS VISUALLY AND 10% WITH A FEELER GAUGE. "TURN OF THE NUT" METHOD IS NOT ACCEPTABLE.

2. WELDED CONNECTIONS: VERIFY THAT WELDERS ARE AWS CERTIFIED FOR THE TYPE OF WELDS BEING MADE. VISUALLY EXAMINE ALL WELDS FOR TYPE, SIZE AND LENGTH FOR COMPLIANCE WITH THE STRUCTURAL DRAWINGS. VERIFY THAT REQUIRED NON-DESTRUCTIVE TESTING IS PERFORMED BY THE TESTING AGENCY. VERIFY THAT WELDS ARE CLEAN, FREE FROM SLAG, AND THAT RUST PROTECTION HAS BEEN APPLIED AS PER SPECIFICATIONS.

2.05 LIGHT GAUGE FRAMING

THE SPECIAL INSPECTOR SHALL OBSERVE INSTALLATION TECHNIQUES OF EXTERIOR WALL LIGHT GAUGE ONLY. THIS WILL INCLUDE WORKMANSHIP; MEMBER SIZE, AND YEILD STRENGTH. INSPECTOR SHALL ENSURE ALL NECESSARY CONNECTIONS ARE INSTALLED FOR ALL LIGHT GAUGE FRAMING ELEMENTS.

PART 3

3.01 MATERIALS TESTING

ALL TESTING REQUIREMENTS AS DEFINED IN THE CONTRACT DOCUMENTS SHALL BE ADHERED TO, WITH COPIES OF RESULTS FORWARDED TO THE SPECIAL INSPECTOR. PRIOR TO EACH INSPECTION THE SPECIAL INSPECTOR SHALL REVIEW ALL MATERIAL TESTS AND REPORT ON THEIR RESULTS. THE SPECIAL INSPECTOR MAY REQUEST THE OWNER'S REPRESENTATIVE TO AUTHORIZE ADDITIONAL TESTS IF REQUIRED BY UNFORESEEABLE EVENTS OR CONDITIONS. ALL MATERIALS TESTING MUST BE EXECUTED BY QUALIFIED LABORATORIES AND TESTING FIRMS.

3.02 SUBMITTALS

A. GENERAL:

CONTRACTOR MUST SUBMIT ONE COPY OF ALL STRUCTURAL SUBMITTALS (EXCLUDING CALCULATIONS) TO THE SPECIAL INSPECTOR FOR HIS RECORD AND USE. ALL SUBMITTALS SHALL BE REVIEWED AND ACCEPTED BY THE CONTRACTOR, ARCHITECT AND STRUCTURAL ENGINEER OF RECORD, AND SHALL CONTAIN APPROPRIATE EVIDENCE OF SUCH, PRIOR TO TRANSMITTING TO THE SPECIAL INSPECTOR.

B. THE SPECIAL INSPECTOR SHALL REVIEW AND BECOME FAMILIAR WITH ALL SUBMITTALS.

C. AS A MINIMUM THE FOLLOWING SHALL BE PROVIDED TO THE SPECIAL INSPECTOR:

1. REINFORCING STEEL:

   FABRICATION AND PLACEMENT DRAWINGS AND BAR LISTS.

2. CONCRETE MIX DESIGNS:

   COPIES OF CONCRETE MIX DESIGNS FOR ALL PROPOSED STRENGTHS AND GRADES.

3. STRUCTURAL STEEL:

   FABRICATION AND ERECTION DRAWINGS FOR ALL STRUCTURAL STEEL COMPONENTS, MILL REPORTS FOR ALL STEEL, WELDER CERTIFICATES.

4. MISCELLANEOUS METALS:

   FABRICATION AND ERECTION DRAWINGS FOR ALL STRUCTURAL METALS, SUCH AS EMBEDDED ANCHORS, CONNECTION PLATES, HANGERS, PRE-FABRICATED STEEL STAIRS, CATWALKS, ETC.

5. LIGHTGAGE FRAMING:

   LIGHTGAGE FRAMING SHOP AND ERECTION DRAWINGS

D. ALTERNATES:

ALTERNATES WHICH ARE ACCEPTED SHALL BE PROVIDED TO THE SPECIAL INSPECTOR AS THEY BECOME AVAILABLE.

SECTION 02050 - MINOR DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Demolition of existing concrete curbing, asphalt, lawn sprinkler system, steel guard rail system & site utilities as shown on Civil Drawings. Minor building demolition as shown on Architectural Drawings.

B. Field verify all existing conditions in area of work, locate all site sewer systems, and lawn sprinkler systems.

1.2 REGULATORY REQUIREMENTS

A. Conform to 2007 Florida Building Code and OSHA regulations.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide, erect, and maintain temporary barriers and security devices.

B. Notify and coordinate work with Owner, adjacent buildings, and potential affected parties which may affect their property, potential noise, utility outage, or disruption.

C. Protect existing items which are not indicated to be removed.

D. Coordinate with Owner prior to demolition as to what items shall be salvaged, and store salvaged items on-site where designated by the Owner.

3.2 DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent building, roadways and operations of existing school facilities.

B. Conduct operations with minimum interference to public or private accesses.

C. Maintain protected egress and access at all times. Do not close or obstruct roadways without permission of Principal and local jurisdictions.

3.3 SELECTIVE DEMOLITION

A. Demolish and remove components in an orderly and careful manner, in sequence as indicated on Architectural and Civil Drawings.

B. Remove designated asphalt areas and prepare surfaces for new asphalt surfaces.

3.4 CLEAN UP

A. Remove demolished materials from site as work progresses.

B. Leave areas of work in clean condition.

C. All salvaged items are to be the property of the Owner; store as indicated by Principal.

END OF SECTION 02050

SECTION 02250 - SOIL TREATMENT

PART 1 GENERAL

1.1 Work Included: This work includes providing termite protection by means of chemical barriers at all under slab areas and at external perimeter foundations of building structures.

1.2 Submittals: Submit information or products from manufacturer indicating EPA approval and application recommendations.

1.3 Guarantee:

A. Upon completion of the soil treatment and as a condition for its final acceptance, the Subcontractor shall furnish to the Owner, a written guarantee that the Subcontractor guarantees the effectiveness of the soil treatment against termite infestation for a period of not less than 5 years from date of substantial completion. Any evidence of infestation within the guarantee period will require treatment without cost to the Owner.

B. The guarantee shall be perpetually renewable at the Owner's option for the life of the buildings at a premium charge consistent with those charged by competitive firms.

PART 2. PRODUCTS

2.1 Chemical Concentration: Chemical and concentration shall be EPA approved products in strength per manufacturer's recommendations. The same chemical shall be used throughout the entire site.

PART 3 EXECUTION

3.1 Inspection of Surfaces: Subcontractor shall inspect all installation conditions and request the Contractor to correct any conditions, which may affect this work adversely. Commencement of work under this Section will be considered as approval of surfaces.

3.2 Surface Conditions:

A. At the time soil treatment is applied, the soil shall be in a friable condition with a low moisture content to allow uniform distribution of the chemical throughout the soil adjacent to the wall and other structures.

B. Application of chemicals shall not be made until all preparation for placing of slabs and other pertinent structures have been completed.

C. Treatments shall not be applied during or immediately after heavy rains.

D. Where concrete slabs and other structures are to be placed over vapor barrier, the chemical shall be applied immediately prior to placement of vapor barrier.

E. Treatment of the soil on the exterior sides of foundation walls, grade beams and similar structures shall be coordinated with final grading operations so as to avoid disturbance of the chemical barriers by such operations.

3.3 Application

A. Application shall be a coarse spray and so as to provide uniform distribution of the chemical on the soil surfaces. All soil surfaces which are disturbed after treatment and before placement of slabs and other covering structures, shall be retreated. All application shall be in accordance with manufacturer's recommendations.

B. Agitate solution thoroughly and periodically to maintain uniform strength and apply as follows:

1. Apply an over-all treatment under entire surfaces of floor slab including porch floors and entrance platforms.

2. Apply to critical areas along both sides of foundation wall, along interior foundation walls, and around plumbing.

C. If after the soil treatment and prior to the placement of the concrete slabs bearing on the soil, measurable rain, in excess of 2" falls on the treated soil the process shall be repeated as outlined above. The Subcontractor is advised to consult the local weather bureau prior to application.

SECTION 02500 - STORM DRAINAGE

PART 1 GENERAL

1.1 **Work Includes**: This section includes the following complete systems with all appurtenances for the installation of storm sewers. The storm sewers under this Section shall include all catch basins, curb inlets, junction boxes, headwalls, and related items.

1.2 **Certificates**: Furnish to the Engineer, affidavits from the manufacturer of pipe, pipe coating, fittings, valves and other equipment furnished and installed under this Section, certifying that such material delivered to the project conforms to the requirements of this specification.

PART 2 PRODUCTS

2.1 **Storm sewer pipe**: Pipe may be one of the following materials unless otherwise specified.

A. Reinforced Concrete Pipe as specified on the plans and conforming to applicable local standards.

B. Corrugated Steel Pipe shall be fully coated with paved invert conforming to the Florida Department of Transportation Standards. The corrugated metal pipe coating shall be applied with a minimum thickness of 0.05 inches at the crest of the corrugation. Joints shall be made with standard coupling bands and fasteners.

C. High Density Polyethylene Pipe shall be ADS N-12, or equal, complying with ASTM F667, standard specification for fittings. HDPE installation shall comply with ASTM D 2321 and shall be installed only where noted on the drawings.

2.2 **Fittings**: Provide proper fittings for the installation and connection of all lines. Connections made by cutting holes in pipes will not be permitted.

2.3 Concrete for sewer structures shall be 3,000 psi and meet the applicable requirements given in SECTION 03300 - CAST IN PLACE CONCRETE.

2.4 Castings for concrete sewer structures shall comply with local standards. Castings for sewer structures shall be of tough, even grained, soft gray iron, free from burnt-on sand and other injurious defects, and of the approximate weight and dimensions shown on the drawings. Before leaving the foundry, castings shall be thoroughly cleaned, subject to hammer test for soundness and given two coats of coal tar pitch varnish.

2.5 Rip-rap shall be Quarry-Run with maximum 150 pound stone, with 35% maximum passing through a #1 sieve. Masonry rubble may be used as a concealed under-base for stone or wherever covered by earth. Masonry rubble shall not be exposed under any circumstances. Rip-rap shall be placed where shown on drawings.

2.6 Headwalls for storm sewer pipe shall be precast concrete or poured-in-place concrete as detailed on plans.

PART 3 EXECUTION

3.1 Trenching and Backfilling:

A. All excavations shall be implemented in accordance with recommendations of the geotechnical engineer in the geotechnical report provided in Appendix B. Subcontractor must read all recommendations of the geotechnical engineer before beginning the work in this section and must comply in all respects with the recommendations of the geotechnical engineer.

B. General: Provide separate trench for each utility. Lay all piping in open trench. Include all storm sewer work complete as shown on the plans including all excavation, backfilling, pipe, structures with tops and aprons, flared end sections, rip rap, etc. Pipe material shall be as called for on plans.

C. Width of the Trench: Excavate trenches of sufficient width for proper installation of the work. When the depth of backfill over sewer pipe exceeds 10 feet, keep the trench below the level of the top of the pipe as narrow as practicable.

D. Sheeting, Bracing, Water Removal: Sheet and brace trenches and remove water, as necessary to fully protect workmen. Comply with local regulations or, in the absence thereof, with the provisions of the "Manual of Accident Prevention in Construction," of the Association of General Contractors of America, Inc. and latest edition of OSHA requirements. Under no circumstances lay pipe or install appurtenances in water, keep the trench free from water until pipe point material has hardened. The presence of water in the soil or the necessity of sheeting or bracing trenches shall not constitute a condition for which any increase may be made in the Contract Price, except that when sheeting is left in place, on the written order of the Architect, the Contract price shall be adjusted. Sheeting left in place shall be cut off not less than 2 feet below finished grade. Sheeting shall not be removed until the trench is substantially backfilled. Dewatering of trenches should be coordinated with the geotechnical report provided in Appendix B.

E. Grading Trench Bottom: Grade the bottom of trenches evenly to insure uniform bearing for the full length of all pipes. Cut holes as necessary for joints and joint making. Excavate all rock, cemented gravel, old masonry or other hard materials to

as least 6 inches below the pipe at all points. Refill such space and all other cuts below grade with sand or fine gravel firmly compacted.

F. Backfilling: Backfill trenches only after piping has been inspected, tested and locations of pipe and appurtenances have been recorded. Backfill by hand around pipe and for a depth of one foot above pipe, use earth without rock fragments or large stones and tamp firmly in layers not exceeding 6 inches in thickness, taking care not to disturb the pipe or injure the pipe coating. Compact the remainder of the backfill thoroughly with an approved mechanical tamper to density specified.

G. Grading and Stockpiling Trenched Material:

1. Control the stockpiling of trenched material in a manner to prevent water running into the excavations.

2. Do not obstruct the surface drainage but provide means by whereby storm and waste waters are diverted into existing gutter, other temporary drains, or surface drains.

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Furnish all labor, materials, tools, equipment, and perform all work and services necessary for all concrete work as shown and specified, in accordance with contract documents, and completely coordinated with work of all other trades.

C. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

D. Investigate mechanical and electrical drawings for items passing above or below footing and adjust footings as required to not interfere with these items.

E. Related Requirements:
   1. See division 2 Section “Earthwork and Geotechnical Report” for “Structural” fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

E. Copies of manufacturer's specifications with installation instructions for proprietary materials including reinforcement, forming accessories, admixtures, joint materials, hardeners, curing materials and other items requested by architect.

F. 5-ft x 5-ft sample slabs of slab trowel, light broom and fine finish for approval. Mock-ups shall include joints and edging.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

C. Fabricated Bar Mats: Welded or clip-assembled steel bar mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars, unless otherwise indicated.

D. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

1. Use supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I, II or I/II.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330/C 330M, 3/4-inch nominal maximum aggregate size.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Water: ASTM C 94/C 94M and potable.

2.5 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, 15 Mils thick polyethylene sheet

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.8 UNACCEPTABLE MATERIALS AND METHODS:

A. Topping of concrete slabs will not be allowed.

B. Use of fiber reinforcing is not permitted.

C. Use of air entraining add mixture at interior floor slabs to receive trowel finish is not permitted.

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Submit written report to architect for each proposed concrete mix at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and are acceptable to architect.
2. Adjust Mix designs when material characteristics, job conditions, weather test results, or other circumstances warrant. Do not use revised concrete mixes until submitted to and accepted by architect

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for concrete with a w/c ratio below 0.50.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:
1. Foundations:
   a. Minimum Compressive Strength: 3500 psi at 28 days.
   b. Maximum W/C Ratio: 0.50
   c. Slump Limit: 5 inches or 7 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
2. Slab on Grade:
   a. Minimum Compressive Strength: 3500 psi at 28 days.
   b. Maximum W/C Ratio: 0.45
   c. Slump Limit: 5 inches or 7 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
   d. Air Content: Due not allow air content of trowel-finished floors to exceed 3 percent.

B. Lightweight concrete
1. Elevated Slabs on Deck
   a. Minimum Compressive Strength: 4000 psi at 28 days.
   a. Calculated Equilibrium Unit Weight: 115 lb/cu. ft. as determined by ASTM C 567/C 567M.
   b. Retain slump limit from two options in "Slump Limit" Subparagraph below or revise to suit Project.
   c. Slump Limit: 4 inches, plus or minus 1 inch (25 mm).
   d. Maximum W/C Ratio: 0.45
   e. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Chamfer exterior corners and edges of permanently exposed concrete.

D. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

E. Provide openings in formwork to accommodate work of other trades. Accurately place and securely support items built into forms.

F. Clean and adjust forms prior to concrete placement. Apply form release agents or wet forms, as required. Retighten forms if required to eliminate mortar leaks

G. Position, Support and secure reinforcement against displacement. Locate and support with chairs, runner, spacers and hangers, as required. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
2. Re-entrant Corners of Slabs: Install perpendicular to each reentrant corner reinforcing bars as indicated.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated. Locate construction joints so as not to impair strength and appearance of structure. Locate isolation and control joints in slabs on grade to stabilize differential settlement and random cracking. Locate control joints as shown and where not shown at a maximum 1 to 2 ratio with area bounded by control joints to be no more than 150 square feet. In walks and drives, locate expansion joints at intervals of 30-ft, unless indicated otherwise.

3.6 WATERSTOP INSTALLATION

A. Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

C. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete. Use setting diagrams, templates and instructions for locating and setting.

D. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.

E. Concrete walks and pads shall have minimum thickness of 4 inches and 8 inches turned down edge. Walks and pads shall be reinforced with welded wire fabric. Tool all walks into squares. All walks shall have under slab vapor barriers.

F. Curbs and Gutters: Shall be constructed in accordance with FDOT specs. When automatic machine placement is used for curb and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.

1. Apply scratch finish to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces as **indicated where ceramic or quarry tile is to be installed by either thickset or thinset method**. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Tine Finish: Apply to curb cut ramps and other areas as noted on drawings. (Do not apply to curb cut ramps if other covering is specified.) Finish shall be applied by an approved hand method and shall consist of transverse grooves which are 0.03 to 0.12 inch in width and 0.10 to 0.15 inch in depth, spaced at approximately 1/2-inch center to center.

H. Fine Tooling: tool edges of paving, gutters, curbs and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces. Radius: 1/2-inch.

3.10 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer **unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project**.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Drill test cores where directed by engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory concrete areas with Portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from concrete pavement for at least 14 days after placement. When construction traffic is permitted, maintain concrete as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete work free of stains, discoloration, dirt and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for substantial completion inspections.

3.12 FIELD QUALITY CONTROL

A. Special Inspections: Owner will employ a special inspector. The contractor employed qualified testing agency shall perform field tests and inspections and prepare test reports in accordance with the project Threshold Inspection in addition to reports provided by the owner engaged special inspector. Contractor will be responsible for accommodating, facilitating, and coordinating the testing outlined in the project Threshold Inspection Plan.

B. Concrete testing services: Contractor employ and pay for testing laboratory acceptable to architect and owner to perform materials evaluation, testing and design of concrete mixes.

C. Certificates, signed by material producer and contractor, may be submitted in lieu of material testing when approved by architect.

D. Quality Control: perform sampling and testing during concrete placement:
1. Sampling: ASTM C-172
2. Slump: ASTM C-143
3. Compressive Strength: ASTM C-39, one (1) set of four (4) cylinders for each class of concrete per day's pour; test one at 7 days, 2 at 28 days, one hold cylinder for testing ast 56 days if required.
4. Test results shall be submitted directly to the architect with copies to the contractor.
5. Slab finish mock-ups.

END OF SECTION 033000

SECTION 034100 - PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes precast structural concrete.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each precast concrete mixture.

C. Shop Drawings:

1. Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.

D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For **Installer**, **fabricator, and testing agency**.

B. Welding certificates.

C. Material certificates.

D. Material Test Reports: For aggregates.

E. Source quality-control reports.

F. Field quality-control **and special inspection** reports.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Designated as a PCI-certified plant as follows:

a. Group C, **Category C1 - Precast Concrete Products (no prestressed reinforcement)**

B. Quality-Control Standard: For manufacturing procedures, testing requirements, and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.6 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design precast structural concrete units.

B. Design Standards: Comply with ACI 318 (ACI 318M) and with design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.

C. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.

1. Fire-Resistance Rating: Select material and minimum thicknesses to provide indicated fire rating.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from **ASTM A 615/A 615M, Grade 60 (Grade 420**, deformed bars, assembled with clips.

D. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.

B. Supplementary Cementitious Materials:

1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
2. Metakaolin: ASTM C 618, Class N.
3. Silica Fume: ASTM C 1240, with optional chemical and physical requirement.
4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
5. Blended Hydraulic Cement: ASTM C 595/C 595M cement.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33/C 33M, with coarse aggregates complying with **Class 5S**. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.4 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.

B. Carbon-Steel-Headed Studs: ASTM A 108, Grade 1010 through 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.

C. Carbon-Steel Plate: ASTM A 283/A 283M, Grade C.

D. Malleable-Iron Castings: ASTM A 47/A 47M, Grade 32510 or Grade 35028.

E. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30 (Grade 415-205).

F. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.

G. Carbon-Steel Structural Tubing: ASTM A 500/A 500M, Grade B or Grade C.

H. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65 (Grade 450).

I. Deformed-Steel Wire or Bar Anchors: ASTM A 496/A 496M or ASTM A 706/A 706M.

J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.

K. High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M) or ASTM A 490 ((ASTM A 490M),) Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563 (ASTM A 563M); and hardened carbon-steel washers, ASTM F 436 (ASTM F 436M).

1. Do not zinc coat ASTM A 490 (ASTM A 490M) bolts.

2.5 BEARING PADS

A. Provide bearing pads for precast structural concrete units as recommended by precast fabricator for application.

2.6 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C 150/C 150M, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.

B. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.

C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
2. Limit use of fly ash to **20** percent replacement of portland cement by weight and ground granulated blast-furnace slag to **20** percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.

D. Normal-Weight Concrete Mixtures: Proportion **face and backup mixtures or full-depth mixtures, at fabricator's option** by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
2. Maximum Water-Cementitious Materials Ratio: 0.45.

E. Water Absorption: Limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.

G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.8 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.

F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.

H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

I. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

J. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.

K. Comply with PCI MNL 116 procedures for hot- and cold-weather concrete placement.

L. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that does not show in finished structure.

M. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

N. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

2.9 FABRICATION TOLERANCES

A. Fabricate precast structural concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 116 product dimension tolerances as well as position tolerances for cast-in items.

2.10 COMMERCIAL FINISHES

A. Commercial Grade: Remove fins and protrusions larger than 1/8 inch (3 mm) and fill holes larger than 1/2 inch (13 mm). Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to 3/16 inch (5 mm).

B. Standard Grade: Normal plant-run finish produced in molds that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch (13 mm) caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are permitted. Fill air holes greater than 1/4 inch (6 mm) in width that occur more than once per 2 sq. in. (1300 sq. mm). Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Limit joint offsets to 1/8 inch (3 mm).

C. Grade B Finish: Fill air pockets and holes larger than 1/4 inch (6 mm) in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than 1/8 inch (3 mm) in width that occur more than once per 2 sq. in. (1300 sq. mm). Grind smooth form offsets or fins larger than 1/8 inch (3 mm). Repair surface blemishes due to holes or dents in molds. Discoloration at form joints is permitted.

D. Grade A Finish: Repair surface blemishes and fill air holes with the exception of air holes 1/16 inch (1.6 mm) in width or smaller, and form marks where the surface deviation is less than 1/16 inch (1.6 mm). Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.

E. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.

F. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

G. Apply roughened surface finish according to ACI 318 (ACI 318M) to precast concrete units that receive concrete topping after installation.

2.11 SOURCE QUALITY CONTROL

A. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements and ASTM C 1610/C 1610M, ASTM C 1611/C 1611M, ASTM C 1621/C 1621M, and ASTM C 1712/C 1712M.

B. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.

B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, shoring, and bracing as required to maintain position, stability, and alignment of units until permanent connections are complete.

1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
2. Remove projecting lifting devices and use plastic patch caps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
3. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.

C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

D. Field cutting of precast units is not permitted without approval of Architect.

E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

F. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

H. Grouting or Dry-Packing Connections and Joints: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled.

3.2 ERECTION TOLERANCES

A. Erect precast structural concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: **Owner will engage** a qualified special inspector to perform the following special inspections:

1. Erection of precast structural concrete members.

B. Testing Agency: **Owner will engage** a qualified testing agency to perform tests and inspections.

C. Visually inspect field welds and test according to ASTM E 165 or to ASTM E 709 and ASTM E 1444. High-strength bolted connections are subject to inspections.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

G. Prepare test and inspection reports.

3.4 REPAIRS

A. Repair precast structural concrete units if permitted by Architect.

1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780/A 780M.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

3.5 CLEANING

A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034100

SECTION 034500 - PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Architectural precast concrete cladding units.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing connection anchors in concrete.
2. Section 047200 "Cast Stone Masonry" for wet- or dry-cast cast stone facings, trim, and accessories.
3. Section 051200 "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.

1.3 DEFINITIONS

A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.

C. Shop Drawings:

1. Detail fabrication and installation of architectural precast concrete units.
2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
4. Indicate details at building corners.

5. Indicate separate face and backup mixture locations and thicknesses.
6. Indicate type, size, and length of welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
8. Include plans and elevations showing unit location and sequence of erection for special conditions.
9. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
10. Indicate relationship of architectural precast concrete units to adjacent materials.
11. Indicate locations, dimensions, and details of thin-brick units, including corner units and special shapes, and joint treatment.
12. Indicate locations, dimensions, and details of stone facings, anchors, and joint widths.
13. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

D. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches (300 by 300 by 50 mm).

1. When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.

E. Delegated-Design Submittal: For architectural precast concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Show governing panel types, connections, types of reinforcement, including special reinforcement, and concrete cover on reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural precast concrete.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer fabricator.

B. Welding certificates.

C. Material Certificates: For the following items:

1. Cementitious materials.
2. Reinforcing materials and prestressing tendons.
3. Admixtures.
4. Bearing pads.
5. Structural-steel shapes and hollow structural sections.
6. Stone anchors.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance to erect **Category A (Architectural Systems) for non-load** bearing members.

B. Installer Qualifications: A precast concrete erector who has retained a "PCI-Certified Field Auditor" to conduct a field audit of a project in same category as this Project and who can produce an Erectors' Post-Audit Declaration.

C. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Designated as a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units **or designated as an APA-certified plant for production of architectural precast concrete products**].
2. Fabricator is located within 500 miles (800 km) of Project site.

D. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

E. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."

1.8 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground or other rehandling.

B. Support units during shipment on nonstaining shock-absorbing material.

C. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

D. Place stored units so identification marks are clearly visible, and units can be inspected.

E. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

F. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Fabricators: Subject to compliance with requirements, provide products by available fabricators offering products that may be incorporated into the Work**.**

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, to design architectural precast concrete units.

B. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

C. Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:

1. Loads: As indicated.
2. Design precast concrete units and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements as follows:

a. Upward and downward movement of **1/2 inch (13 mm)**.

3. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of **80 deg F (26 deg C).**

2.3 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

B. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

2.4 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Epoxy-Coated Reinforcing Bars: **ASTM A 615/A 615M, Grade 60** deformed bars.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from steel wire into flat sheets.

D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

E. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

2.5 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.

1. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.

B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33/C 33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

C. Lightweight Aggregates: Except as modified by PCI MNL 117, ASTM C 330/C 330M, with absorption less than 11 percent.

D. Coloring Admixture: ASTM C 979/C 979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.

E. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
7. Plasticizing Admixture: ASTM C 1017/C 1017M, Type I.
8. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
9. Corrosion Inhibiting Admixture: ASTM C 1582/C 1582M.

2.6 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.

B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or Type B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

C. Carbon-Steel Plate: ASTM A 283/A 283M, Grade C.

D. Deformed-Steel Wire or Bar Anchors: ASTM A 496/A 496M or ASTM A 706/A 706M.

E. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A or ASTM F 1554, Grade 36 (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.

F. Zinc-Coated Finish: For exterior steel items**, steel in exterior walls,** and items indicated for galvanizing, apply zinc coating by **hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M electrodeposition according to ASTM B 633, SC 3, Types 1 and 2**.

G. Shop-Primed Finish: Prepare surfaces of nongalvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply **lead- and chromate-free, rust-inhibitive primer**.

H. Welding Electrodes: Comply with AWS standards.

2.7 ACCESSORIES

A. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.

2.8 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C 150/C 150M, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.

B. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.

2.9 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Use a single design mixture for units with more than one major face or edge exposed.

B. Limit use of fly ash and ground granulated blast-furnace slag to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.

C. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.

D. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.

E. Normal-Weight Concrete Mixtures: Proportion **full-depth mixture** by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi (34.5 MPa) minimum.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.

G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.

H. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.10 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished work.
2. Edge and Corner Treatment: Uniformly **chamfered**.

2.11 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
3. Place reinforcing steel and prestressing strands to maintain at least 3/4-inch (19-mm) minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches (38 mm) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

D. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

E. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

F. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

G. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.

1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.

H. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

I. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.

J. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

K. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.12 FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

2.13 FINISHES

A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved **design reference sample sample panels mockups**] and as follows:

1. Design Reference Sample
2. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.
3. As-Cast Surface Finish: Provide surfaces to match approved sample for acceptable surface, air voids, sand streaks, and honeycomb.

B. Finish exposed **top** surfaces of architectural precast concrete units to match face-surface finish.

C. Finish unexposed surfaces of architectural precast concrete units with as cast finish.

2.14 SOURCE QUALITY CONTROL

A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, ASTM C 1610/C 1610M, ASTM C 1611/C 1611M, ASTM C 1621/C 1621M, and ASTM C 1712.

B. Strength of precast concrete units is considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.

C. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M and ACI 318 (ACI 318M).

D. Defective Units: Discard and replace recast architectural concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.

B. Do not install precast concrete units until supporting cast-in-place concrete has attained minimum allowable design compressive strength and supporting steel or other structure is structurally ready to receive loads from precast concrete units.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

1. Install temporary steel or plastic spacing shims as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
4. Unless otherwise indicated, maintain uniform joint widths of 3/4 inch (19 mm).

C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

D. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

1. Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.

E. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot.

F. Grouting or Dry-Packing Connections and Joints: Grout connections where required or indicated. Retain flowable grout in place until hard enough to support itself. Alternatively,

pack spaces with stiff dry-pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

A. Erect architectural precast concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

3.4 FIELD QUALITY CONTROL

A. Visually inspect field welds and test according to ASTM E 165 or to ASTM E 709 and ASTM E 1444. High-strength bolted connections are subject to inspections.

B. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS

A. Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.6 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.

2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and division 01 specification sections, apply to this section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Concrete building brick.
3. Decorative concrete masonry units.
4. Pre-faced concrete masonry units.
5. Concrete face brick.
6. Clay face brick.
7. Building (common) brick.
8. Hollow brick.
9. Mortar and Grout
10. Steel Reinforcing Bars
11. Masonry Joint Reinforcement
12. Ties & Anchors
13. Miscellaneous masonry accessories

B. Related sections:
1. Section 05500 "metal fabrications" for furnishing steel lintels and shelf angles for unit masonry.
2. section 07620 "sheet metal flashing and trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
3. Section 01813 - sustainable design requirements

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Product certificates: for products and materials required to comply with requirements for regional materials indicating location and distance from project of material manufacturer and point of extraction, harvest, or recovery for each raw material. The intent is, where possible based on approved selections, to comply with regional material criteria and minimize products outside the radius to lessen shipping impacts to the environment. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
2. Recycled content: provide manufacturer's documentation indicating separate percentages, by weight, of post-consumer and pre-consumer recycled content. Also include material costs, excluding cost of installation.

B. Shop Drawings:
1. For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
2. **Show elevations of reinforced walls.**

C. Samples for Verification: For each type and color of **exposed masonry.**

D. Mix Designs: For each type of mortar **and grout**. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. Shop drawings: for the following:
1. Masonry units: show sizes, profiles, coursing, and locations of special shapes.
2. Masonry ties: data and samples of each shown or specified.
3. Reinforcing steel: detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "details and detailing of concrete reinforcement."
4. Fabricated flashing: detail corner units, end-dam units, and other special applications.

F. Samples for initial selection:
1. Ground face block from manufacturer's full range
2. Mortar
3. Weep holes/ vents.

G. Samples for verification: for each type and color of the following:
1. Face brick, in the form of straps of five or more bricks.
2. Ground face CMU
3. Special shapes CMU
4. Mortar. Make samples using same sand and mortar ingredients to be used on project.
5. Weep holes and vents.
6. Masonry ties
7. Accessories embedded in masonry.

H. Green globe submittals:
1. EPD (environmental product declaration: provide for each product and component

contained herein, where applicable, an EPD or other third party verified product life cycle as- assessment identified by one of the following:

A. Provide industry wide EPD or brand specific EPD
B. NSF sustainability assessment standards
C. UL environmental sustainability standards
D. Sustainable minds transparency report framework
E. Assessment based on iso 14040:2006 and iso 14044:2006

2. Product material cost: provide total material cost for each separate product called for herein as described in section 01813 - sustainable design requirements. Cost is to be for materials only is to exclude cost of installation.

1.5 INFORMATIONAL SUBMITTALS

A. Material List of materials used in constructing mockups: list generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the contract documents unless such deviations are specifically brought to the attention of architect and approved in writing. QUALITY ASSURANCE

B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for **each type of exposed unit masonry construction** in sizes approximately **48 inches** long by **48 inches** high **by full thickness**.

C. Qualification data: for testing agency.

D. Material certificates: for each type and size of the following:

1. Masonry units.

A. Include material test reports substantiating compliance with requirements.

B. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.

C. For exposed brick, include test report for efflorescence according to ASTM C 67.

D. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing per ASTM C 67 or a list of addresses of buildings in project's area where proposed brick has been used successfully and with a history of durability.

E. Ground face CMU

2. Cementitious materials. Include brand, type, and name of manufacturer.

3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.

4. Grout mixes. Include description of type and proportions of ingredients.

5. Reinforcing bars.

6. Joint reinforcement.

7. Anchors, ties, and metal accessories. Product Data: For each type of product.

E. Mix designs: for each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/c 109m for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.

2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

F. Cold-weather and hot-weather procedures: detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6

1.7 QUALITY ASSURANCE

A. Testing agency qualifications: qualified according to ASTM C 1093 for testing indicated.

B. Source limitations for masonry units: obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

C. Source limitations for mortar materials: obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Masonry standard: comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the contract documents.

E. Sample panels: build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in section 014000 "quality requirements" for mockups.
   1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness.
   2. Clean one-half of exposed faces of panels with masonry cleaner that is approved by the masonry manufacturer for the substrate.
   3. Protect approved sample panels from the elements with weather-resistant membrane.
   4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by architect in writing.
   5. Approval of sample panels does not constitute approval of deviations from the contract documents contained in sample panels unless such deviations are specifically approved by architect in writing.

F. Mockups: build integrated exterior mockup. Comply with requirements in section 01400 “quality requirements” for mockups. Mockup shall incorporate other trades and materials and is to include typical exterior wall conditions: masonry cavity wall construction, anchors, insulation, sealant, flashing, drainage, air barrier, fenestration, typical window head, sill, and jamb conditions, steel framed walls, sheathing, veneers and cladding, and associated accessories, etc.

G. Pre-installation conference: conduct conference at project site to comply with requirements in section 01310 "project management and coordination." [

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

A. Protection of masonry: during construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold cover securely in place.

2. Where one wythe of multi wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain prevention: prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-weather requirements: do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-weather cleaning: use liquid cleaning methods only when air temperature is 40 deg f (4 deg c) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-weather requirements: comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Brick: utility size, 3-5/8" by 3-5/8" by11-1/2" and economy size 3-5/8" x 3-5/8" x 7 5/8". Comply with ASTM C 216, grad SWl type FBS. Special shapes as indicated or as required by building configuration. See architectural drawings for dimensional requirements of all veneer systems.

C. Concrete masonry unit: lightweight, ASTM C 140 and c 90 type ii, grade n; 7-5/8" by 15-5/8" face size. Special shapes as indicated or as required. Provide units with minimum average net-area compressive strength of 200 PSI.

D. Mortar: ASTM C 270, masonry cement mortar, type n above grade; type m below grade; other types as required by application. Inorganic oxide mortar pigments.

E. Grout for unit masonry: comply with ASTM C 476.

F. Reinforcing:
1. Ties and reinforcing: hot-dipped galvanized, ASTM A 153.
2. Horizontal reinforcing: welded ladder type, 9 gage wire with deformed side rods.
3. Brick to block ties: 3/16" diameter adjustable double hook & eye; Hohmann & Bar- nard lox-all adjustable eye-wire or approved equal.
4. Misc. Masonry to masonry ties: Hohmann & Barnard : lox-all wall ties. Pintles and ties with 2x-hook or approved equal.
5. Brick to stud wall ties: Hohmann & Barnard hb-213-2x adjustable veneer anchors with 12 ga. Back plate and 3/19" diameter hook.
6. Weld on steel to masonry ties: Hohmann & Barnard 14 ga. 360 gripstay channel with 3/16" diameter 363 anchor with 12 ga. Head
7. Reinforcing bars: deformed bars, ASTM A 615, grade 60.

G. Miscellaneous materials:
1. Cavity drainage material: 2" thick +/-, see drawings, high density polyethylene, 90% open mesh, dovetail shaped to maintain unobstructed drainage at weep holes; mortar net green or approved equal.
2. Weep holes: rectangular plastic tubing with cotton wick and stainless-steel screen, clear butyrate, 3/8" x 1-1/2" x 3-1/2"; Hohmann & Barnard 342w/s or approved equal. Install minimum of 4" above finish grade.

H. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

I. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Regional materials: CMUS shall be manufactured within 500 miles (800 km) of project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of project site.

B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

C. Integral Water Repellent: Provide units made with integral water repellent **for exposed units and where indicated**.

D. CMUs: ASTM C 90.
1. Density Classification: **Lightweight unless otherwise indicated**.

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **2800 psi**.
3. Density Classification: **Lightweight**.

2.3 CONCRETE LINTELS

A. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. **Provide lintels with net-area compressive strength not less than that of CMUs.**

2.4 BRICK

A. Regional Materials: Brick shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

B. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face brick: facing brick complying with ASTM C
   1. Grade: mw or sw.
   2. Type: FBS.
   3. Initial rate of absorption: less than 30 g/30 sq. In. (30 g/194 sq. Cm) per minute when tested per ASTM C 67.
   4. Efflorescence: provide brick that has been tested according TO ASTM C 67 and is rated "not effloresced."
   5. Size (actual dimensions): economy (3-5/8” x 3-5/8” x 7-5/8”)
      Utility (3-5/8” x 3-5/8” x 11-5/8”)
   6. Color and texture:
      A. Basis-of-design face brick – See drawings.

2.5 MORTAR AND GROUT MATERIALS

A. Regional Materials: Aggregate for mortar and grout shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

B. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

E. Masonry Cement: ASTM C 91/C 91M.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.

G. Aggregate for Mortar: ASTM C 144.

   1. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
   2. White-Mortar Aggregates: Natural white sand or crushed white stone.
   3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

H. Aggregate for Grout: ASTM C 404.

I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

J. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

K. Water: Potable.

2.6 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: **Hot-dip** galvanized carbon steel.
2. Exterior Walls: **Hot-dip galvanized carbon** steel.
3. Wire Size for Side Rods: **0.187-inch** diameter.
4. Wire Size for Cross Rods: **0.148-inch** diameter.
5. Wire Size for Veneer Ties: **0.187-inch** diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet**, with prefabricated corner and tee units**.

C. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder **or truss** type with single pair of side rods.

D. Masonry-Joint Reinforcement for Multiwythe Masonry:

1. Ladder type with one side rod at each face shell of hollow masonry units more than 4 inches (100 mm) wide, plus **one side rod** at each wythe of masonry 4 inches (100 mm) wide or less.
2. Tab type, either ladder or truss design, with one side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe, but with at least 5/8-inch (16-mm) cover on outside face.
3. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch (1.5 mm) and maximum vertical adjustment of 1-1/4 inches (32 mm). Size ties to extend at least halfway through facing wythe but with at least 5/8-inch (16-mm) cover on outside face.

2.7 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
2. Galvanized steel sheet: ASTM a 653/a 653m, commercial steel, g60 (z180) zinc coating.
3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide. General: unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.

1. Wire: Fabricate from **3/16-inch** diameter, hot-dip galvanized-steel wire.

D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized-steel wire.
2. Tie Section: Triangular-shaped wire tie made from **0.187-inch-**diameter, hot-dip galvanized-steel wire.

E. Partition top anchors: 0.105-inch- (2.66-mm-) thick metal plate with 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

F. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from [**0.105-inch- (2.66-mm-) thick steel sheet, galvanized after fabrication**
2. Tie Section: Triangular-shaped wire tie made from **0.25-inch** diameter, hot-dip galvanized-steel wire.

G. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

H. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.

1. Corrosion Protection: **Hot-dip galvanized to comply with ASTM A 153/A 153M**.

I. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf (445-N) load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch (1.5 mm).
2. Fabricate sheet metal anchor sections and other sheet metal parts from **0.105-inch- thick steel sheet, galvanized after fabrication**].
3. Fabricate wire ties from **0.25-inch-** diameter, hot-dip galvanized-steel wire unless otherwise indicated.
4. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section.
5. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a gasketed sheet metal anchor section, with pronged legs of length to match thickness of insulation or sheathing and raised rib-stiffened strap to provide a slot for inserting wire tie.

6. Seismic Masonry-Veneer Anchors: Connector section and rib-stiffened, sheet metal anchor section with screw holes top and bottom, and having slotted holes for inserting connector section. Connector section consists of a rib-stiffened, sheet metal bent plate, sheet metal clip, or wire tie with rigid PVC extrusion designed to engage continuous wire.
7. Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except with hex washer head and neoprene or EPDM washer, No. 10 (4.83-mm) diameter, and with coating with salt-spray resistance to red rust of more than 800 hours according to ASTM B 117.

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees[**and hemmed**].
2. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
3. Fabricate metal expansion-joint strips from [**stainless steel**] [**copper**] to shapes indicated.

B. Flexible Flashing: Use[**one of**] the following unless otherwise indicated:

1. Copper-Laminated Flashing: [**5-oz./sq. ft. (1.5-kg/sq. m)**] [**7-oz./sq. ft. (2-kg/sq. m)**] copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than [**0.030 inch (0.76 mm)**] [**0.040 inch (1.02 mm)**].

3. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than [**0.030 inch (0.8 mm)**] [**0.040 inch (1.0 mm)**].
4. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
5. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.02 mm) thick.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from [**neoprene**] [**urethane**] [**or**] [**PVC**].

B. Preformed Control-Joint Gaskets: Made from [**styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805**] [**or**] [**PVC, complying with ASTM D 2287, Type PVC-65406**] and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

D. Weep/Cavity Vent Products: Use[**one of**] the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.
    a. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.
    a. <Double click here to find, evaluate, and insert list of manufacturers and products.>
3. Vinyl Weep Hole/Vent: Units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.

a. <Double click here to find, evaluate, and insert list of manufacturers and products.>

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2. Configuration: Provide one of the following:

a. Strips, full depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.
b. Strips, not less than [**3/4 inch (19 mm)**] [**1-1/2 inches (38 mm)**] thick and 10 inches (250 mm) high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
c. Sheets or strips full depth of cavity and installed to full height of cavity.
d. Sheets or strips not less than [**3/4 inch (19 mm)**] [**1 inch (25 mm)**] <**Insert thickness**> thick and installed to full height of cavity, with additional strips 4 inches (100 mm) high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from clogging with mortar.

2.10 MASONRY-CELL FILL

A. Loose-Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

B. Lightweight-Aggregate Fill: ASTM C 331/C 331M.

2.11 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.12 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use[**portland cement-lime** mortar unless otherwise indicated.
3. For exterior masonry, use **portland cement-lime** mortar.

4. For reinforced masonry, use **portland cement-lime** mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, **Proportion** Specification. Provide the following types of mortar for applications stated unless another type is indicated **or needed to provide required compressive strength of masonry**.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use **Type M**.
3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
4. For interior nonload-bearing partitions, Type O may be used instead of Type N.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, **Table 1, but not less than 3000 psi**
3. Provide grout with a slump of 8 **to 11 inches** as measured according to ASTM C 143/C 143M.

E. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

1. Application: Use epoxy pointing mortar for exposed mortar joints with the following units:

   a. Pre-faced CMUs.
   b. Glazed structural clay facing tile.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the work.
1. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

G. Provide special shapes where indicated and or specified. If indicated in one location, it is implied to be installed at similar conditions.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

   1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.

2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12 mm) maximum.
7. 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than [4-inches (100-mm)]. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and resuming work: stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive

mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
1. install compressible filler in joint between top of partition and underside of structure above.
2. fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUS solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) O.C. Unless otherwise indicated.
3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with section 078446 "fire-resistive joint systems."

3.5 MORTAR BEDDING AND JOINTING

A. Lay [**hollow brick**] [**and**] [**CMUs**] as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid masonry units[**and hollow brick**] with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated. Tooled joints at walls receiving epoxy is not desired nor necessary. All masonry to receive air barrier shall have joints tooled.

D. Cut joints flush for masonry walls to receive resinous wall systems, plaster or other direct-applied finishes (other than paint and air barrier) unless otherwise indicated. Cut brick around extended joist tails in order to raise brick behind nested stud.

E. Lay structural clay tile as follows:

1. Lay vertical-cell units with full head joints unless otherwise indicated. Provide bed joints with full mortar coverage on face shells and webs.
2. Lay horizontal-cell units with full bed joints unless otherwise indicated. Keep drainage channels, if any, free of mortar. Form head joints with sufficient mortar so excess will be squeezed out as units are placed in position. Butter both sides of units to be placed, or butter one side of unit already in place and one side of unit to be placed.
3. Maintain joint thicknesses indicated except for minor variations required to maintain bond alignment. If not indicated, lay walls with 1/4- to 3/8-inch- (6- to 10-mm-) thick joints.

F. Rake out mortar joints at [**pre-faced CMUs**] [**and**] [**glazed structural clay tile**] to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

H. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 COMPOSITE MASONRY

A. Bond wythes of composite masonry together [**using one of the following methods**] [**as follows**]:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for [**4.5 sq. ft. (0.42 sq. m)**] [**2.67 sq. ft. (0.25 sq. m)**] [**1.77 sq. ft. (0.16 sq. m)**] of wall area spaced not to exceed [**36 inches (914 mm)**] [**24 inches (610 mm)**] [**16 inches (406 mm)**] o.c. horizontally and 16 inches (406 mm) o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (914 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches (610 mm) o.c. vertically.
2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.

    a. Where bed joints of both wythes align, use [**ladder-type reinforcement extending across both wythes**] [**tab-type reinforcement**].
    b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement[**with continuous horizontal wire in facing wythe attached to ties**].

B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

C. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with mortar at [**exterior walls, except cavity walls**] [**, and**] [**interior walls and partitions**].

D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.

E. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide individual metal ties not more than [**8 inches (203 mm)**] [**16 inches (406 mm)**] o.c.
2. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
3. Provide rigid metal anchors not more than [**24 inches (610 mm)**] [**48 inches (1220 mm)**] o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.7 CAVITY WALLS

A. Bond wythes of cavity walls together [**using one of the following methods**] [**as follows**]:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for [**4.5 sq. ft. (0.42 sq. m)**] [**2.67 sq. ft. (0.25 sq. m)**] [**1.77 sq. ft. (0.16 sq. m)**] of wall area spaced not to exceed [**36 inches (914 mm)**] [**24 inches (610 mm)**] [**16 inches (406 mm)**] o.c. horizontally and 16 inches (406 mm) o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (915 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches (610 mm) o.c. vertically.
2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
    a. Where bed joints of both wythes align, use [**ladder-type reinforcement extending across both wythes**] [**tab-type reinforcement**].
    b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement[**with continuous horizontal wire in facing wythe attached to ties**].
    c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement[**with continuous horizontal wire in facing wythe attached to ties**] to allow for differential movement regardless of whether bed joints align.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Parge cavity face of backup wythe in a single coat approximately 3/8 inch (10 mm) thick. Trowel face of parge coat smooth.

D. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches (300 mm) o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

3.8 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to [**wall framing**] [**and**] [**concrete and masonry backup**] with[**seismic**] masonry-veneer anchors to comply with the following requirements:

1. Fasten [**screw-attached**] [**and**] [**seismic**] anchors [**through sheathing to wall framing**] [**and**] [**to concrete and masonry backup**] with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed [**tie sections**] [**connector sections and continuous wire**] in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than one anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.
5. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 25 inches (635 mm) o.c. horizontally, with not less than one anchor for each [**2.67 sq. ft. (0.25 sq. m)**] [**3.5 sq. ft. (0.33 sq. m)**] of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.
6. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and horizontally. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 24 inches (610 mm), around perimeter.

3.9 MASONRY-CELL FILL

A. Pour [**loose-fill insulation**] [**lightweight-aggregate fill**] into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet (6 m).

3.10 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings[**in addition to continuous reinforcement**].

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions

3.11 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than **1/2 inch** wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.12 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.[**Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.**]

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape[**as recommended by flashing manufacturer**].
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of [**4 inches (100 mm)**] [**8 inches (200 mm)**], and through inner wythe to within 1/2 inch (13 mm) of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches (50 mm) on interior face.
3. At openings, where thru wall flashing is interrupted, turn up flashing not less then 2 inches (50mm) to form end dams.
4. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use [**specified weep/cavity vent products**] [**or**] [**open head joints**] to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
4. Space weep holes formed from plastic tubing or wicking material 16 inches (400 mm) O.C.
5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
6. Trim wicking material flush with outside face of wall after mortar has set.

E. Place cavity drainage material in [**cavities**] [**airspace behind veneers**] to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

F. Install cavity vents in head joints in exterior wythes at spacing indicated. Use [**specified weep/cavity vent products**] [**or**] [**open head joints**] to form cavity vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.13 CONTROL AND EXPANSION JOINTS

A. General: install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in- plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:
1. Fit bond-breaker strips into hollow contour in ends of CMU’s on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick as follows:
1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches (100 mm) in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.

2. Build flanges of factory-fabricated, expansion-joint units into masonry.
3. Build in compressible joint fillers where indicated.
4. Form open joint full depth of brick wythe and of width indicated, but not less than [3/8 inch (10 mm)] for installation of sealant and backer rod specified in section 079200 "joint sealants."

3.14 LINTELS

A. Install steel lintels where indicated.

B. Install masonry or precast concrete masonry lintels where indicated.

C. Provide masonry or precast lintels where shown and where openings of more than 4 inches (305 mm) for brick-size units and 8 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.

D. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated

3.15 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than **60**.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level **B** in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

H. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for **mortar air content and compressive strength**.

I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.17 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch (19 mm). Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3 mm per 300 mm). Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.18 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: during the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent

construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2a applicable to type of stain on exposed surfaces.
8. Clean stone trim to comply with stone supplier's written instructions.
9. Clean limestone units to comply with recommendations in Ili’s "Indiana limestone handbook."

3.19 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

B. Salvageable materials: unless otherwise indicated, excess masonry materials are contractor's property. At completion of unit masonry work, remove from project site.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 042113 - BRICK MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Face brick.
2. Mortar and grout.
3. Ties and anchors.
4. Embedded flashing.
5. Miscellaneous masonry accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Selection:

1. Face brick, in the form of straps of five or more bricks.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence according to ASTM C 67.

2. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
3. Anchors, ties, and metal accessories.

1.5 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 BRICK

A. Regional Materials: Brick shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

C. Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area).

1. Grade: SW.
2. Type: FBX or FBS.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Application: Use where brick is exposed unless otherwise indicated.
5. Where shown to "match existing," provide face brick matching color range, texture, and size of existing adjacent brickwork.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

2.4 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.

B. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick, steel sheet, galvanized after fabrication.

2.5 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Use the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Advanced Building Products Inc.; Peel-N-Seal.
2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.

4) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
5) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
6) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
7) Hohmann & Barnard, Inc.; Textroflash.
8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.

b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

B. Application: Unless otherwise indicated, use the following:

1. Where flashing is partly exposed and is indicated to terminate at the wall face, use flexible flashing with a metal drip edge or
2. Where flashing is fully concealed, use flexible flashing.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity. Use only for weeps.
2. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
3. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
4. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Advanced Building Products Inc.; Mortar Maze weep vent.
2) Blok-Lok Limited; Cell-Vent.
3) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
4) Heckmann Building Products Inc.; No. 85 Cell Vent.
5) Hohmann & Barnard, Inc.; Quadro-Vent.
6) Wire-Bond; Cell Vent.

B. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Advanced Building Products Inc.; Mortar Break.

b. Archovations, Inc.; CavClear Masonry Mat.
c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
d. Mortar Net USA, Ltd.; Mortar Net.

2. Provide one of the following configurations:

a. Strips, full-depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep that prevent clogging with mortar droppings.
b. Strips, not less than3/4 inch thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
c. Sheets or strips full depth of cavity and installed to full height of cavity.
d. Sheets or strips not less than 1 inch thick and installed to full height of cavity with additional strips 4 inches high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from clogging with mortar.

2.7 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

2.8 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

D. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

E. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet , or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch .
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern to match existing masonry. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow brick as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing and to concrete masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.7 EXPANSION JOINTS

A. General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:

1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

A. Install steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
5. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
6. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products or open head joints to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c. unless otherwise indicated.
4. Space weep holes formed from plastic tubing or wicking material 16 inches o.c.
5. Trim wicking material flush with outside face of wall after mortar has set.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

F. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products or open head joints to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.10 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042113

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
2. Section 01813 – Sustainable Design Requirements
3. Section 09960 “High performance Coatings”

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

C. Green Globe Submittals:
1. EPD (Environmental Product Declaration): Provide for each product and component contained herein, where applicable, an EPD or other third party verified project life cycle assessment identified by one of the following:
   a. Provide industry wide EPD or brand specific EPD
   b. NSF sustainability assessment standards
   c. UL environmental sustainability standards
   d. Sustainable minds transparency report framework
   e. Assessment based on ISO 14040;2006 and ISO 14044:2006
2. Product Material Cost: Provide total material cost for each separate product called for herein as described in section 01813 – sustainable design requirements. Cost is to be for materials only is to exclude cost of installation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, and testing agency.

B. Welding certificates.

C. Mill test reports for structural steel, including chemical and physical properties.

D. Source quality-control reports.

E. Field quality-control and special inspection reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 360.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.7 STORAGE AND PROTECTION

A. Store steel members off ground and protect steel members and packaged materials from erosion and deterioration.

B. Store fasteners in a protect place. Clean and relubricate bolts and nuts that become dry or rusty before use.

1. AISC 303.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
1. Engineering Responsibility: Fabricator's responsibilities include using a qualified

professional engineer to prepare structural analysis data for structural-steel connections.

2. Select and complete connections using schematic details indicated and AISC 360.
3. Use Allowable Stress Design; data are given at service-load level. Use Allowable Stress Design; data are given at service-load level.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Shear wall system with Moment Frames.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

D. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.

1. Finish: Plain.

E. Threaded Rods: ASTM A 36/A 36M.

1. Finish: Plain.

2.4 PRIMER

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Steel exposed to weather (as indicated): Refer to plans and Section 09960 “High Performance Coatings” for additional requirement for exposed steel

C. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.

E. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

F. Non-exposed steel: one of the following with dry film thickness 1.5 mils and as recommend by primer manufacturer and compatible with topcoat
   1. Benjamin Moore Supoer Spec HP Shop Coat Alkyd P-14
   2. Century Industrial Coatings 220-R-347
   3. Diamond Vogel PN-5521 Red Oxide
   4. Duron #33-676 Red Oxide
   5. Forrest Technical Coatings 16P
   6. Insul X Corotech Shop Primer – V142 Series
   7. PPG Amercoat 370
   8. Pratt & Lambert QD Red Oxide Primer S4501
   9. Rodda Paint Barrier III High Solids Metal Primer
   10. Rust-Oleum K7769 Rusty Metal Primer (41-8176)
   11. Sherwin Williams Dura-Plate 235 B67W235
   12. Sherwin Williams Macropoxy 646
   13. Sherwin Williams E61AC82
   14. Sherwin Williams Steel Spec Fast Dry B50AV1021
   15. Sherwin Williams Acrolon 218HS
   16. Sherwin Williams Procryl B66W310
   17. Sumer Coatings 100D7714 Dark Gray Shopcoat Primer

2.5 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened., unless indicated as slip-critical, direct=tension, or tensioned shear/bearing connections.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. Steel exposed to weather (as indicated): SSPC-SP 6; “Commercial Blast Cleaning”
5. Non-exposed steel: SSPC-SP 2, "Hand Tool Cleaning”

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete-and masonry bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections The contractor employed qualified testing agency shall perform field tests and inspections and prepare test reports in accordance with the project Threshold Inspection Plan in addition to reports provided by the owner engaged special inspector. Contractor will be responsible for accommodating, facilitating, and coordinating the testing outlined in the project Threshold Inspection Plan.

1. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Shear Connectors: In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
   a. Inspect suds for full 360 degree flash
   b. ping test all shear connectors with a 3 lb hammer
   c. Perform bend tests to 15 degrees on all studs with less than 360 degree flash, welding repairs, flat ping sound or otherwise questionable shear connector.
   d. Conduct tests on additional shear connectors if weld fracture occurs on shear
3. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
4. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

   a. Liquid Penetrant Inspection: ASTM E 165.
   b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   c. Ultrasonic Inspection: ASTM E 164.
   d. Radiographic Inspection: ASTM E 94.

END OF SECTION 051200

SECTION: 052100 – STEEL JOISTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. K-series steel joists.
2. K-series steel joist substitutes.
3. JG-series steel joists girders.
4. LH-series (Long-Span) steel joists.
5. DLH-series (Deep Long-Span) steel joists.
6. Joist accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product indicated.

B. Shop Drawings:
1. Include layout, designation, number, type, location, and spacings of joists.
2. Include joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Manufacturer certificates.

C. Mill Certificates: For each type of bolt.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in-service performance.

1. Manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.

B. SJI Specifications: Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI's "Specifications" for chord and web members.

B. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers; plain, uncoated.

C. High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers; plain, uncoated.

2.2 PRIMERS

A. Primer: SSPC-Paint 15, Type I, red oxide; FS TT-P-636, red oxide; or manufacturer's standard shop primer complying with performance requirements of either of these red-oxide primers.

B. Primer: one of the following with dry film thickness 1.5 mils and as recommend by primer manufacturer and compatible with topcoat.
1. Benjamin Moore Supoer Spec HP Shop Coat Alkyd P-14
2. Century Industrial Coatings 220-R-347
3. Diamond Vogel PN-5521 Red Oxide
4. Duron #33-676 Red Oxide
5. Forrest Technical Coatings 16P
6. Insul X Corotech Shop Primer – V142 Series
7. PPG Amercoat 370
8. Pratt & Lambert QD Red Oxide Primer S4501
9. Rodda Paint Barrier III High Solids Metal Primer
10. Rust-Oleum K7769 Rusty Metal Primer (41-8176)
11. Sherwin Williams Dura-Plate 235 B67W235
12. Sherwin Williams Macropoxy 646
13. Sherwin Williams E61AC82
14. Sherwin Williams Steel Spec Fast Dry B50AV1021
15. Sherwin Williams Acrolon 218HS
16. Sherwin Williams Procryl B66W310
17. Sumer Coatings 100D7714 Dark Gray Shopcoat Primer

2.3 STEEL JOISTS

A. Manufacture steel joists according to SJI's "Specifications," with steel-angle top- and bottom-chord members, and as follows:

1. Manufacture K-series steel joists according to "Standard Specifications for Open Web Steel Joists, K-Series," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

2. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members

B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

2.4 JOIST GIRDERS

A. Manufacture joist girders according to "Standard Specifications for Joist Girders," in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements indicated.

B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

2.5 JOIST ACCESSORIES

A. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

B. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction, extend ends to within 1/2-inch of finished wall surface unless otherwise indicated.

C. High-Strength bolts, nuts, and washers: ASTM A 325, Type I, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 Hardened Carbon-Steel Washers.

1. Finish: Plain.

D. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

E. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.6 CLEANING & SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Apply 1 shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil (0.025 mm) thick. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
   1. Before installation, splice joists delivered to Project site in more than one piece.
   2. Space, adjust, and align joists accurately in location before permanently fastening.
   3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts, unless otherwise indicated.

E. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated. Comply with RCSC's "Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams. Provide additional L2x2x1/4 angle for bracing beam elements as shown on the structural drawings.

G. Bolt joists to supporting steel framework using carbon-steel bolts.

Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Owner will employ a special inspector. The contractor employed qualified testing agency shall perform field tests and inspections and prepare test reports in accordance with the project Threshold Inspection Plan in addition to reports provided by the owner engaged special inspector. Contractor will be responsible for accommodating, facilitating, and coordinating the testing outlined in the project Threshold Inspection Plan.

1. Visually inspect field welds according to AWS D1.1/D1.1M.

2. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 05 21 00

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SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Composite floor deck.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:
1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product certificates.

C. Evaluation reports.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Retain “Recycled Content of Steel Products” Paragraph below to specify recycled content if applying for LEED Credit MR 4. USGBC allows a default value of 25 percent to be used for steel, without documentation; higher percentages can be claimed if they are supported by appropriate documentation. The Steel Recycling Institute indicates that steel sheet typically has 23 percent postconsumer recycled content and 1.5 percent preconsumer recycled content.

C. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized-Steel Sheet: Type B Roof Deck: ASTM A 653/A 653M, Structural Steel (SS), Grade 80, G90 zinc coating.
2. Galvanized and Shop-Primed Steel Dovetail Acoustical Deck: ASTM A 653, Structural Steel (SS), Grade 40, G60 zinc coating; cleaned, pretreated, and primed with manufacturer’s standard baked-on, rust-inhibitive primer.
   a. Color: Grey top surface with white underside. Deck Profile: As indicated.
3. Deck Profile: As Indicated; Type B, Wide Rib
4. Design Uncoated-Steel Thickness: As indicated.

2.3 COMPOSITE FLOOR DECK

A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G90 zinc coating.
2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

G. Galvanizing Repair Paint: ASTM A 780.

H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

G. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

H. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.

I. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

J. Pour Stops and Girder Fillers: Weld steel-sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

K. Floor-Deck Closures: Weld steel-sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Owner will employ a special inspector. The contractor employed qualified testing agency shall perform field tests and inspections and prepare test reports in accordance with the project Threshold Inspection Plan (Spec Section 00960) in addition to reports provided by the owner engaged special inspector. Contractor will be responsible for accommodating, facilitating, and coordinating the testing outlined in the project Threshold Inspection Plan.

1. Field welds will be subject to inspection.

2. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents. Field welds will be subject to inspection.

B. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

C. Remove and replace work that does not comply with specified requirements.

D. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.3 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Exterior non-load-bearing wall framing.
2. Interior non-load bearing wall framing exceeding heigh limitations of standard, nonstructural metal framing.
3. Exterior light gauge soffit and roof framing.

B. Related Sections:
1. Section 01813 -Sustainable Design Requirements.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.

b. Interior Non-Load Bearing Framing: Horizontal deflection of l/360 of the wall height.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Green Globe Submittals:
1. EPD (Environmental Product Declaration): Provide for each product and component contained herein, where applicable, an EPD or other third party verified project life cycle assessment identified by one of the following:
   a. Provide industry wide EPD or brand specific EPD
   b. NSF sustainability assessment standards
   c. UL environmental sustainability standards
   d. Sustainable minds transparency report framework
   e. Assessment based on ISO 14040:2006 and ISO 14044:2006
2. Product Material Cost: Provide total material cost for each separate product called for herein as described in section 01813 – sustainable design requirements. Cost is to be for materials only is to exclude cost of installation

C. Engineered Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, spliced, accessories, connection details, and attachment to adjoining work.

1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product test reports.

D. Research/evaluation reports.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet compiles with requirements.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

F. Mockups: Build integrated exterior mockup. Comply with requirements in Section 01400 “Quality Requirements” for mockups. Mockup shall incorporate other trades and materials and is to include typical exterior wall conditions: Masonry cavity wall construction, anchors, insulation, sealant, flashing, drainage, air barrier, fenestration, typical window head, sill, and jamb conditions, steel framed walls, sheathing, veneers and cladding, and associated accessories, etc.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 MATERIALS COLD-FORMED STEEL FRAMING, GENERAL

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: **As required by structural performance**.
2. Coating: **G90**.

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: **0.0428 inch**.
2. Flange Width: **1-5/8 inches minimum**.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.

C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.

D. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.1 INTERIOR NON-LOAD BEARING WALL FRAMING

A. Steel Framing: Manufacturer's standard C-shaped steel joists, of web depths indicated, punched, with stiffened flanges, and as follows: Retain appropriate grout from "Cement Grout"

and "Nonmetallic, Nonshrink Grout" paragraphs below if concrete or masonry substrates require leveling before setting track or prefabricated assemblies.

1. Minimum Base-Metal Thickness: 0.04329 inch and as indicated on drawings.

2. Flange Width: 1-5/8 inches, minimum.

3. Section Properties: As Required

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and same minimum base-metal thickness as steel studs.

C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.

2.2 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration.

2.3 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, **Grade 36**, threaded carbon-steel **hex-headed bolts** and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by **hot-dip process according to ASTM A 153/A 153M, Class C**.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

E. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction based on ICC-ES AC01 ICC-ES AC193 ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
   1. Uses: Securing cold-formed steel framing to structure.

F. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.4 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: **ASTM A 780**.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install bearing shims or grout between the underside of wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

C. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

D. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.2 INSTALLATION, GENERAL

A. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated

C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

D. Install framing members in one-piece lengths.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

G. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to **top and** bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As required.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements. Indicate isolation details on Drawings or insert detailed description here.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.

2. Install double deep-leg deflection tracks and anchor outer track to building structure.

3. Connect vertical deflection clips to infill studs and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

a. Install solid blocking at 96-inch centers. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

2. Bridging: Proprietary bridging bars installed according to manufacture’s written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.

3.4 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
   1. Stud Spacing: As indicated

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Install single deep-leg deflection tracks and anchor to building structure.
   2. Install double deep-leg deflection tracks and anchor outer track to building structure.
   3. Connect vertical deflection clips to infill studs and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
   1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   2. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will employ a special inspector. The contractor employed qualified testing agency shall perform field tests and inspections and prepare test reports in accordance with the project Threshold Inspection Plan (Spec Section 00960) in addition to reports provided by the owner engaged special inspector. Contractor will be responsible for accommodating, facilitating, and coordinating the testing outlined in the project Threshold Inspection Plan.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 054000

SECTION 054400 - COLD-FORMED METAL TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-formed steel trusses for roofs.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel trusses.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product test reports.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified testing indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing. All trusses and connections to the embed plates as shown on the Structural Construction documents shall be designed by the Truss Manufacturers Specialty Engineer. This is the responsibility of the Contractor to engage the Engineer to provide all necessary bridging and connection design for a complete roof system.

B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.
2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
   a. Roof Trusses: Vertical deflection of 1/240 of the span.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

C. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: Design according to AISI S210.
2. Lateral Design: Design according to AISI S213.
3. Roof Trusses: Design according to AISI S214.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.2 COLD-FORMED STEEL TRUSS MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, structural grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.

2. Coating: G90.

2.3 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard C-shaped steel sections.

1. Connecting Flange Width: 1-5/8 inches, minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
2. Minimum Base-Metal Thickness: 18 gauge thickness, 16 gauge top chord requirement for decking attachment

2.4 ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, structural grade, Type H, metallic coated, of same grade and coating weight used for truss members.

B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and Appendix D in ACI 318, greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

C. Power-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.

B. Shims: Load bearing, of high-density multimonomer plastic, nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

2.7 FABRICATION

A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate trusses using jigs or templates. Do not stick build trusses on site. This is not allowed and trusses shall be rejected.
2. Cut truss members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed steel trusses without reducing thickness of fire-resistive materials below that is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.2 INSTALLATION

A. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened.

1. Fasten cold-formed steel trusses by welding or mechanical fasteners.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings; comply with requirements for spacing, edge distances, and screw penetration.

C. Install temporary bracing and supports. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

D. Truss Spacing: As indicated.

E. Do not alter, cut, or remove framing members or connections of trusses.

F. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.

G. Erect trusses without damaging framing members or connections.

H. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.

I. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's TechNote 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses.".

J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform inspections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Field and shop welds will be subject to testing and inspecting.

D. Prepare test and inspection reports.

3.4 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal trusses are without damage or deterioration at time of Substantial Completion.

END OF SECTION 054400

SECTION 055113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with **concrete-filled** treads.
2. **Steel tube** railings attached to metal stairs.
3. **Steel tube** handrails attached to walls adjacent to metal stairs.

1.2 ACTION SUBMITTALS

A. Product Data: For metal pan stairs.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For stairs **and railings**, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs **and railings**.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.

C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
b. Infill load and other loads need not be assumed to act concurrently.

D. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

1. Component Importance Factor: 1.5.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: **ASTM A 500**.

D. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M structural steel, Grade 25 (Grade 170), unless another grade is required by design loads; exposed.

E. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, **either commercial steel, Type B, or** structural steel, Grade 30 (Grade 205), unless another grade is required by design loads.

2.3 ABRASIVE NOSINGS

A. Cast-Metal Units: Cast iron, with an integral abrasive, as-cast finish.

B. Extruded Units: Aluminum units with abrasive filler in an epoxy-resin binder.

1. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.
2. Provide solid-abrasive-type units without ribs.

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

D. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

E. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

A. Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

2.5 MISCELLANEOUS MATERIALS

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Shop Primers: Provide primers that comply with **Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."** [**Section 099600 "High-Performance Coatings."**] [**Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."**]

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

E. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa) unless otherwise indicated.

F. Welded Wire Reinforcement: ASTM A 185/A 185M, 6 by 6 inches (152 by 152 mm), W1.4 by W1.4, unless otherwise indicated.

2.6 PRECAST CONCRETE TREADS

A. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 5000 psi (35 MPa) and a total air content of not less than 4 percent or more than 6 percent.

B. Reinforcement: Galvanized, welded wire reinforcement, 2 by 2 inches (50 by 50 mm) by 0.062-inch- (1.6-mm-) diameter wire; comply with ASTM A 185/A 185M and ASTM A 82/A 82M, except for minimum wire size.

2.7 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts,[**railings,**] clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for **Type 3 welds: partially dressed weld with spatter removed**.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

2.8 STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," [**Commercial**] [**Service**] Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of steel **channels**.

   a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel **channel** headers and miscellaneous framing members as **needed to comply with performance requirements**.
3. Weld **or bolt** stringers to headers; weld **or bolt** framing members to stringers and headers. **If using bolts, fabricate and join so bolts are not exposed on finished surfaces.**
4. Where stairs are enclosed by gypsum board **shaft-wall** assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness [**needed to comply with performance requirements, but not less than 0.067 inch (1.7 mm)**] [**indicated**].

D. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms to configurations shown from steel sheet of thickness [**needed to comply with performance requirements, but not less than 0.097 inch (2.5 mm)**] [**indicated**].

2.9 STAIR RAILINGS

A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.

1. Rails and Posts: [**1-5/8-inch- (41-mm-) diameter**] [**1-1/2-inch- (38-mm-) square**] top and bottom rails and 1-1/2-inch- (38-mm-) square posts.
2. Picket Infill: 1/2-inch- (13-mm-) [**round**] [**square**] pickets spaced less than 4 inches (100 mm) clear.
3. Expanded-Metal Infill: Expanded-metal panels edged with U-shaped channels made from steel sheet and not less than 0.043 inch (1.1 mm) thick. Orient expanded metal with long dimension of diamonds [**parallel to top rail**] [**perpendicular to top rail**] [**vertical**].
4. Perforated-Metal Infill: Perforated-metal panels edged with U-shaped channels made from metal sheet, of same metal as perforated metal, and not less than 0.043 inch (1.1 mm) thick. Orient perforated metal with pattern [**parallel to top rail**] [**perpendicular to top rail**] [**horizontal**] [**vertical**] [**as indicated on Drawings**].
5. Mesh Infill: Woven wire mesh crimped into 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) steel channel frames. Orient wire mesh with [**diamonds vertical**] [**wires perpendicular and parallel to top rail**] [**wires horizontal and vertical**].
6. Intermediate Rails Infill: [**1-5/8-inch- (41-mm-) diameter**] [**1-1/2-inch- (38-mm-) square**] intermediate rails spaced less than [**12 inches (305 mm)**] [**21 inches (533 mm)**] clear.

B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for **Type 1 welds: no evidence of a welded joint** as shown in NAAMM AMP 521.

C. Form changes in direction of railings by bending[**or by inserting prefabricated elbow fittings**].

D. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

E. Close exposed ends of railing members with prefabricated end fittings.

F. Provide wall returns at ends of wall-mounted handrails.

G. Connect posts to stair framing by direct welding.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.

I. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses.

2.10 FINISHES

A. Finish metal stairs after assembly.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints.

D. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

E. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete.

F. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 INSTALLING RAILINGS

A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

1. Anchor posts to steel by [**welding**] [**or**] [**bolting**] to steel supporting members.
2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.

B. Attach handrails to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION 055113

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

B. Related Sections:

1. Section 055100 "Metal Stairs" for steel tube railings associated with metal stairs.
2. Section 057300 "Decorative Metal Railings" for ornamental railings fabricated from pipes and tubes.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Steel: 72 percent of minimum yield strength.

C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
b. Infill load and other loads need not be assumed to act concurrently.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.2 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide flat-head machine screws for exposed fasteners unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

D. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."

E. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

F. Intermediate Coats and Topcoats: Provide products that comply with Section 099123 "Interior Painting."

2.5 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

J. Form changes in direction as follows:

1. As detailed.
2. By bending or by inserting prefabricated elbow fittings.

K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.7 STEEL AND IRON FINISHES

A. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning.":

1. Other Railings: SSPC-SP 3, "Power Tool Cleaning."

C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with universal shop primer.

D. Shop-Painted Finish:

1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
   1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends or connected to railing ends using nonwelded connections.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.

C. Attach railings to wall with wall brackets. Provide brackets with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

   1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
   2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

D. Secure wall brackets and railing end flanges to building construction as follows:

   1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
   2. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

   1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 057300 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel and iron decorative railings with stainless-steel wire-rope guard infill.

1.3 DEFINITIONS

A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas and for pedestrian guidance and support, visual separation, or wall protection.

1.4 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not meet structural performance requirements.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of railings assembled from standard components.

B. Shop Drawings: Include plans, elevations, sections, and attachment details.

C. Samples for Initial Selection: For products involving selection of color, texture, or design.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
1. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches (600 mm) in length.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods, including structural analysis, preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

2.2 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.

2. Steel: 72 percent of minimum yield strength.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior railings by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.3 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.4 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.

B. Extruded Bars and Shapes, Including Extruded Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.

C. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.

1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.

D. Drawn Seamless Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.

E. Plate and Sheet: ASTM B 209 (ASTM B 209M).

F. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.5 STEEL AND IRON

A. Tubing: ASTM A 500/A 500M (cold formed) or ASTM A 513.

B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.6 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:

1. Aluminum Components: Type 304 stainless-steel fasteners.
2. Dissimilar Metals: Type 304 stainless-steel fasteners.
3. Stainless-Steel Components: Type 304 Type 316 stainless-steel fasteners.
4. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

2.8 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

F. Connections: Fabricate railings with welded connections unless otherwise indicated.

G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds; no evidence of a welded joint.

H. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

I. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

J. Form changes in direction as follows:

1. As detailed.
2. By bending
3. By radius bends of radius required.
4. By bending to smallest radius that will not result in distortion of railing member.

K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of hollow railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and to prevent bracket or fitting rotation and crushing of substrate.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.10 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.11 STEEL AND IRON FINISHES

A. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, but galvanize anchors to be embedded in exterior concrete or masonry.

B. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning.

C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with universal shop primer.

D. Powder-Coat Finish: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:

1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils.
4. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

3.4 ATTACHING RAILINGS

A. Anchor railing ends to concrete and masonry with brackets on underside of rails connected to railing ends and anchored to wall construction with anchors and bolts.

B. Attach handrails to walls with wall brackets. Provide brackets with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt predrilled hole for exposed bolt anchorage.
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.

3.5 CLEANING

A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."

3.6 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION 057300

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wood furring, grounds, nailers, and blocking.

1.3 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for the following products:

1. Metal framing anchors.

C. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:

1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

D. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

1. Metal framing anchors.
2. Power-driven fasteners.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Wood-Preservative-Treated Materials:

a. Osmose, Inc. - Wood Preservation Products.

2.2 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. SPIB - Southern Pine Inspection Bureau.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

D. Provide dressed lumber, S4S, unless otherwise indicated.

E. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Do not use chemicals containing chromium or arsenic.

B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, and vapor barriers.

2.3 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.4 STRUCTURAL-USE PANELS FOR BACKING

A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch thick.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
   1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM-A 153/ A 153M-05 or of Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: FS-FF-N-105.

C. Power-Driven Fasteners: CABO-NER-272.

D. Wood Screws: ASME-B 18.6.1.

E. Lag Bolts: ASME-B 18.2.1 / Heavy hex structural bolts: ASME B18.2.6.

F. Bolts: Steel bolts complying with ASTM-A 307-07b, Grade A; with ASTM-A 563-07a hex nuts and, where indicated, flat washers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. "Table 1705.1--Fastening Schedule," of the 2007 Florida Building Code.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or

will receive finish materials. Make tight connections between members. Install fasteners without splitting wood: pre-drill as required.

G. Use hot-dip galvanized or stainless steel nails where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity.

H. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

END OF SECTION 061000

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.
3. Solid Surfacing Countertop Material.
4. Related Requirements:

5. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.

C. Samples for Initial Selection:

1. Plastic laminates.
2. PVC edge material.
3. Thermoset decorative panels.
4. Solid Surface Countertop Material.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For the following:

1. Composite wood and agrifiber products.
2. Thermoset decorative panels.

3. High-pressure decorative laminate.
4. Solid Surface Countertop Material.
5. Adhesives.

B. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificatesEvaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade; Custom

C. Type of Construction: Face frame.

D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Edges: [Grade HGS] [PVC tape, .125 minimum thickness, matching laminate in color, pattern, and finish] Delete "Materials for Semiexposed Surfaces" Paragraph below for woodworker's option from choices in standard.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS

2. Drawer Sides and Backs: Solid-hardwood lumber
3. Drawer Bottoms: Hardwood plywood

H. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.

I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued dovetail joints.

K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated on interior sheets of the drawings.

2.2 SOLID SURFACING MATERIAL COUNTERTOPS

A. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
a. Wilsonart International; Div. of Premark International, Inc.
2. Type: Standard type unless Special Purpose type is indicated.
3. Colors and Patterns: As indicated on interior finish sheets in the drawings.
4. Grade
5. Solid-Surfacing-Material Thickness: ¾ inch (19mm)
6. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication and finishing.
1. Fabricate tops with shop-applied edges of materials and configuration indicated.
2. Fabricate tops with loose backsplashes for field application.
8. Drill holes in countertops for plumbing fittings and soap dispensers in shop.
9. Provide radius corners at all outside corner locations.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130 made with binder containing no urea formaldehyde.
2. Particleboard: ANSI A208.1, [Grade M-2, made with binder containing no urea formaldehyde

3. Softwood Plywood: DOC PS 1, medium-density overlay.
4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1[, made with adhesive containing no urea formaldehyde].
5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets..

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter

E. Catches: Magnetic catches, BHMA A156.9, B03141

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081

G. Shelf Rests: BHMA A156.9, B04013;[metal

H. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and full-extension type; zinc-plated steel with polymer rollers.
2. Satin Stainless Steel: BHMA 630.

I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Do not use adhesives that contain urea formaldehyde.

D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate cabinets to dimensions, profiles, and details indicated.

C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails[or finishing screws] for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 072100 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Expanded urethane foam insulation to seal around perimeter of building between steel deck and top of masonry wall.
2. Unfaced batt insulation, 3 1/2-inch thickness; above ceilings where indicated.
3. Faced batt insulation, 6” thickness, above entry soffits where indicated.

NOTE: Rigid polyisocyanurate roof insulation is specified under Preformed Metal Roofing and in Section 07210-Building Insulation. General Contractor shall decide if these materials are to be furnished by the General Contractor or the subcontractors so there will be no duplication in the bids.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 4 Section "Unit Masonry" for insulation installed in masonry walls.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of insulation product specified.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide insulation products by one of the following:

1. Batt Insulation:
   a. Owens-Corning Co.
   b. CertainTeed Corp.

2. Rigid Polyisocyanurate Board Insulation:
   a. Atlas Roofing Corporation (AC Foam)
   b. Hunter Panels.
   c. Owens Corning Insulating Systems, LLC.
   d. R Max Inc.
   e. Johns Manville.

3. Expanded Spray Urethane Foam Insulation:
   a. Two-component Polyurethane E-84 Class 1 “Handi-Foam E-84 Class 1" System II-205 (Item # HF205FR-II-205 FR) by FOMO FOAM Products, Division of Commercial Thermal Solutions, Inc.
      6 Worthington Avenue, Spring Lake, NJ 07762, (800) 339-3531.
      http://www.fomofoam.com/NEWPDFS/E84-TDS.pdf
   b. Equal products shall be ASTM E-84 Class 1 with a Flame Spread Index of 25 and Smoke Developed 200.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

B. Foam insulation:

1. Install 1 1/2-inch cavity wall insulation up tight against steel deck. Blow urethane foam to fill the area between top of masonry wall and bottom of steel deck with minimum of 3-inch of urethane. Complete approximately 20' of insulation and examine with the TMP for approval before proceeding with balance of project.

2. Blow urethane foam to fill all voids between tops of CMU walls, and steel stud and gypsum board draftstop partitions and bottom of steel roof deck.

C. Batt Insulation:

1. Install 3 1/2-inch unfaced batt insulation above electrical and communications room ceiling in new classroom building, as well as above ceilings adjacent to classroom walls as indicated on the drawings.

2. Install 6" Kraft-faced batt insulation above exterior entrance soffits as indicated on the drawings

D. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

E. Recycled Content: Not less than 50 percent blend of post consumer and recovered polystyrene resins.

F. Polyisocyanurate Board: Provide Polyisocyanurate Board insulation for roof deck application, complying with ASTM C 1289-07 Type I – foil faced both sides. Minimum compressive strength shall be 23 pounds per square inch (PSI). Board shall provide a thermal resistance (R-value) of 6.0 per inch thickness, minimum. Insulation shall have 2 percent maximum linear change when conditioned at 158 F (70 C) and 97 shall have been cured for 24 hours minimum, plusan additional 24 hours minimum per inch of thickness, at a minimum of 60 F (16 C) before shipment from the manufacturer. Insulation board shall be installed in two (2) layers. The bottom layer shall be 1 1/2" thick, and the top layer shall be 1 1/2" thick for a total overall insulation thickness of 3". Board size shall be 4-foot by 8-foot maximum board size for mechanically attached insulation boards. Joints in the top layer shall be staggered vertically and offset from the joints in the underlying layers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Apply single layer of insulation to produce thickness indicated.

E. Rigid polyisocyanurate board roof insulation shall be fastened to the metal roof decking with FM-approved fasteners and insulation plates at the rate of 1 (one) fastener per 6.4 square feet, minimum for 4'x8' boards, and at rate of 1 (one) fastener per 4 square feet for 4'x4' boards. Refer to FM Loss Prevention Data Sheet 1-29 for special considerations regarding perimeters and corners of roof.

3.4 PROTECTION

A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072200 - ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:
   1. Installation of tapered and non-tapered roof insulation.

B. Related Sections include the following:
   1. Section 07552, “Hybrid SBS – Modified Bituminous Membrane Roofing”.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM C 1289 (1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

ASTM E 84 (2001) Surface Burning Characteristics of Building Materials

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM A/S4470 (1986; R 1992) Class I Roof Covers

FM P7825 (1999) Approval Guide

UNDERWRITERS LABORATORIES (UL)

UL BMD (1997) Building Materials Directory

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01330, "Submittals.
   1. Product Data
      a. Fasteners
      b. Insulation
   2. Test Reports
      a. Flame spread and smoke developed ratings
      b. Submit in accordance with ASTM E 84.
   3. Certificates
      a. Installer qualifications
   4. Manufacturer's Instructions
      a. Nails and fasteners
      b. Roof insulation, including field of roof and perimeter attachment requirements.
   5. Shop Drawings: Include plans, sections, details, and attachments to other work, for the following:

a. Tapered insulation layout plan, including slopes, with thickness indicated, and cross sections showing composite construction.
b. Crickets, saddles, and tapered edge strips, including slopes.

1.4 MANUFACTURER'S CERTIFICATE

A. Submit certificate from the insulation manufacturer attesting that the installer has the proper qualifications for installing tapered roof insulation systems.

1.5 QUALITY ASSURANCE

A. Roof insulation shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E 84. Insulation bearing the UL label and listed in the UL BMD as meeting the flame spread and smoke developed ratings will be accepted in lieu of copies of test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:
   1. Name of manufacturer;
   2. Brand designation;
   3. Specification number, type, and class, as applicable, where materials are covered by a referenced specification; and

   Deliver materials in sufficient quantity to allow continuity of the work.

B. Storage and Handling: Store and handle materials in a manner to protect from damage, exposure to open flame or other ignition sources, and from wetting, condensation or moisture absorption. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Replace damaged material with new material.

1.7 ENVIRONMENTAL CONDITIONS

A. Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F or when there is ice, frost, or moisture visible on the roof deck.

PART 2 PRODUCTS

2.1 INSULATION

A. General: Provide tapered, and non-tapered, insulation where indicated on the drawings, and to establish slope requirements indicated.
   1. Provide non-tapered insulation boards where roof areas have slope built-in to existing deck, to provide positive slope to gutters or eaves.
   2. Provide preformed saddles, crickets, tapered edge strips and other insulation shapes as required for sloping to scuppers, gravel stops or gutters. Fabricate to slopes indicated.
   3. Provide preformed, tapered insulation boards where indicated for sloping to drains, gravel stops or gutters. Fabricated with the following taper:
      a. 1/8” per inches, unless other wise indicated.

B. Insulation Types:
   1. Non-tapered roof insulation.
   2. Tapered roof insulation.

C. Roof insulation shall be the following material and compatible with attachment methods for the specified insulation and roof membrane:

   1. Polyisocyanurate Board: ASTM C 1289 Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength shall be 140 kPa 20 pounds per square inch (psi).

D. Recovered Materials: Provide thermal insulation materials containing recycled materials to the extent practical. The required minimum recycled material content for the listed materials are:

   1. Polyisocyanurate 9 percent recovered material

E. Insulation Thickness: 2” thick minimum as indicated on the drawings.

F. Manufacturers
   1. Atlas Roofing Corporation
   2. Celotex Corporation
   3. Johns Manville Corporation
   4. GAF Building Materials Corporation

2.2 FASTENERS

A. Flush-driven through flat round or hexagonal steel plates. Steel plates shall be zinc-coated, flat round not less than 1 3/8 inch diameter or hexagonal not less than 0.4 mm 28 gage. Plates shall be formed to prevent dishing. Do not use bell-or cup-shaped plates. An independent party shall perform fastener pull out test for each roof system. The roofing manufacturer shall verify the test results as acceptable for the roofing system.

2.3 WOOD NAILERS

Pressure-preservative-treated as specified in Section 06100, "Rough Carpentry."

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Surface Inspection
Surfaces shall be clean, smooth, and dry. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work. The Contractor shall inspect and approve the surfaces immediately before starting installation.

B. Surface Preparation
Correct defects and inaccuracies in roof deck surface to eliminate poor drainage and hollow or low spots and perform the following:

a. Install wood nailers the same thickness as insulation at eaves, edges, curbs, walls, and roof openings for securing cant strips, gravel stops, and flashing flanges.

3.2 INSULATION INSTALLATION

Apply insulation in single layers. Lay insulation so that continuous longitudinal joints are perpendicular to direction of roofing. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and offset in both directions with respect to layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface.

3.3 PROTECTION

A. Protection of Applied Insulation
Completely cover each day's installation of insulation with the finished roofing on same day. Do not permit phased construction. Protect open ends of each day's work with temporary water cutoffs, and remove when work is resumed. Protect open spaces between insulation and parapets or other walls and spaces at curbs and expansion joints, until permanent roofing and flashing are applied. Do not permit storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight.

B. Damaged Work and Materials
Restore work and materials that become damaged during construction to original condition or replace with new materials.

END OF SECTION 072200

SECTION 072413 - EXTERIOR INSULATION AND STUCCO SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Stucco-clad barrier-wall assemblies that are field applied over substrate.

B. Related Requirements:
1. Section 072729 "Air-Barrier Coatings" for synthetic polymer coatings applied over sheathing under EIFS-clad barrier-wall assemblies.
2. Section 079200 "Joint Sealants" for sealing joints in EIFS with elastomeric joint sealants and for perimeter joints between EIFS and other materials.

1.3 DEFINITIONS

A. Definitions in ASTM E 2110 apply to Work of this Section.

B. IBC: International Building Code.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1.5 ACTION SUBMITTALS

A. Product Data: For each Stucco component, trim, and accessory.

B. Samples: For each exposed product and for each color and texture specified, **8 inches (200 mm) square** in size.

C. Samples for Initial Selection: For each type of finish-coat color and texture indicated.

1. Include similar Samples of exposed accessories involving color selection.

D. Samples for Verification: 24-inch- (600-mm-) square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including **an aesthetic reveal**.

E. Provide Florida Product Approval Number from manufacturer of specific system being submitted and as specified.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For **Installer**.

B. Manufacturer Certificates: Signed by Stucco System manufacturer certifying the following:

1. Substrate is acceptable to manufacturer.
2. Accessory products installed with EIFS, including **joint sealants, flashing, water-resistant barriers,** whether or not furnished by Stucco manufacturer and whether or not specified in this Section, are acceptable to manufacturer.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: **An installer certified in writing by Stucco manufacturer as qualified to install manufacturer's system using trained workers**.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.

B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1. Stack insulation board flat and off the ground.
2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.9 FIELD CONDITIONS

A. Weather Limitations: Maintain ambient temperatures above 40 deg F (4.4 deg C) for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1.10 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace Stucco System that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Bond integrity and weathertightness.
b. Deterioration of finishes and other materials beyond normal weathering.

2. Warranty coverage includes the following EIFS components:

a. Stucco finish, including base and finish coats and reinforcing mesh.
b. Insulation installed as part of the system.
c. Insulation adhesive **and mechanical fasteners**.
d. Accessories, including trim components and flashing.

3. Warranty Period: **Five** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, [**provide products by the following**] [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

B. Basis-of-Design Product: Subject to compliance with requirements, provide:
1. Sto Corp.-StoPowerwall Extra Seal

C. Source Limitations: Obtain materials from single source from single manufacturer and from sources approved by Stucco System manufacturer as tested and compatible with all components.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E 2568 **and ICC-ES AC219** and with the following:

1. Weathertightness: Resistant to water penetration from exterior.
2. Structural Performance: assembly and components shall comply with ICC-ES AC219 when tested according to ASTM E 2568.
   a. Wind Loads: Uniform pressure as indicated on Drawings.

   Impact Performance: ASTM E 2568, **High** impact resistance**.**

3. Bond Integrity: Free from bond failure within components or between Stucco Systems and substrates, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   a. Temperature Change: **100 deg F (55 deg C)**

2.3 EIFS MATERIALS

A. Primer/Sealer: manufacturer's standard substrate conditioner designed to protect substrates from moisture penetration and to improve the bond between substrate and insulation adhesive**.**

B. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; manufacturer's standard or product recommended in writing by manufacturer.

C. Insulation Adhesive: manufacturer's standard formulation designed for indicated use; compatible with substrate**.**

D. Molded, (Extruded) Rigid Polystyrene Board Insulation: Comply with Stucco manufacturer's requirements for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations.
   1. Foam Build-Outs: Provide with profiles and dimensions indicated on Drawings.

E. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other system materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) according to ASTM E 2098.

F. Base-Coat Materials: EIFS manufacturer's standard mixture and complying with **one of** the following:

   1. Job-mixed formulation of portland cement complying with ASTM C 150/C 150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
   2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.

G. Waterproof Adhesive/Base-Coat Materials: manufacturer's standard waterproof formulation and complying with **one of** the following:

1. Job-mixed formulation of portland cement complying with ASTM C 150/C 150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.

H. Mechanical Fasteners: manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; designed to resist Project's design loads; capable of pulling fastener head below surface of insulation board; and complying with the following:
1. For attachment to light-gage steel framing members not less than 0.0179 inch (0.45 mm) in thickness, provide steel drill screws complying with ASTM C 1002.
2. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.
3.

I. Primer: manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

J. Finish-Coat Materials: manufacturer's **standard acrylic-based coating with enhanced mildew resistance** complying with the following:

1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

2. Colors: **As selected by Architect from manufacturer's full range**.
3. Textures: **As selected by Architect from manufacturer's full range**.

K. Sealer: Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.

L. Water: Potable.

M. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784 and ASTM C 1063.

1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
3. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
4. Windowsill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.

2.4 MIXING

A. Comply with manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by manufacturer. Mix materials in clean containers. Use materials within time period specified by manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where Stucco System will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Begin coating application only after surfaces are dry.
2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Protect contiguous work from moisture deterioration and soiling caused by application of Stucco System. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

B. Protect substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind Stucco System and deterioration of substrates.

C. Prepare and clean substrates to comply with manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.

1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

3.3 INSTALLATION, GENERAL

A. Comply with ASTM C 1397, ASTM E 2511, and manufacturer's written instructions for installation of system as applicable to each type of substrate.

3.4 TRIM INSTALLATION

A. Trim: Apply trim accessories at perimeter of Stucco System, at expansion joints, **at windowsills,** and elsewhere as indicated. Coordinate with installation of insulation.

1. Drip Screed/Track: Use at bottom edges of Stucco unless otherwise indicated.
2. Windowsill Flashing: Use at windows unless otherwise indicated.
3. Expansion Joint: Use where indicated on Drawings.
4. Casing Bead: Use at other locations.

3.5 INSULATION INSTALLATION

A. Board Insulation: **Adhesively** attach insulation to substrate in compliance with ASTM C 1397 and the following:

1. Sheathing: Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to substrate. Apply adhesive to a thickness of not less than 1/4 inch (6.4 mm) for factory mixed and not less than 3/8 inch (9.6 mm) for field mixed, measured from surface of insulation before placement.
2. Concrete or Masonry: Apply adhesive by ribbon-and-dab method.
3. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
4. Allow adhered insulation to remain undisturbed for not less than 24 hours, before[**installing mechanical fasteners,**] beginning rasping and sanding insulation or before applying base coat and reinforcing mesh.Retain first subparagraph below only with mechanical or adhesive-and-mechanical attachment method.

5. Apply insulation over dry substrates in courses with long edges of boards oriented horizontally.
6. Begin first course of insulation from a level base line and work upward.
7. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
8. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches (300 mm) wide or 6 inches (150 mm) high. Offset joints not less than 6 inches (150 mm) from corners of window and door openings **and not less than 4 inches (100 mm) from aesthetic reveals**.

    a. Adhesive Attachment: Offset joints of insulation not less than 6 inches (150 mm) from horizontal and 4 inches (100 mm) from vertical joints in sheathing.

9. Interlock ends at internal and external corners.
10. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch (1.6 mm) occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
11. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.

12. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch (19 mm).
13. Install foam build-outs and attach to **structure**.
14. Interrupt insulation for expansion joints where indicated.
15. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
16. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
17. Fully wrap board edges with strip reinforcing mesh.
18. Treat exposed edges of insulation as follows:

    a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
    b. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.

19. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and finish coats.

B. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:

1. At expansion joints in substrates behind Stucco System.
2. At dissimilar substrates, materials, and construction.
3. Where manufacturer requires joints in long continuous elevations.

3.6 BASE-COAT INSTALLATION

A. Base Coat: Apply to exposed surfaces of insulation **and foam build-outs** in minimum thickness recommended in writing by manufacturer, but not less than **1/16-inch (1.6-mm)** dry-coat thickness.

B. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C 1397 and manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches (200 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

C. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings, extending 4 inches (100 mm) beyond perimeter. Apply additional 9-by-12-inch (230-by-300-mm) strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- (200-

mm-) wide, strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches (100 mm) on each side of corners.

1. At aesthetic reveals, apply strip reinforcing mesh not less than 8 inches (200 mm) wide.
2. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.

D. Foam Build-Outs: Fully embed reinforcing mesh in base coat.

3.7 FINISH-COAT INSTALLATION

A. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.

B. Finish Coat: Apply over dry base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by manufacturer.

3.8 CLEANING AND PROTECTION

A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 072413

SECTION 072700 - FIRESTOPPING AND SMOKESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Firestopping of all penetrations through fire barriers.
2. Smokestopping of all penetrations through smoke barriers.

B. Work not included: Repairing penetrations made in error and repairing penetrations which are too large to be sealed by the methods indicated; these are to be repaired using the original material of the constructions.

1.2 SUBMITTALS

A. Schedule of Firestopping: Complete list, for approval, of penetrations to be sealed, indicating location, fire rating of penetrated assembly, identification of penetration seal to be used, fire rating of penetration seal, and evidence of acceptable testing.

B. Schedule of Smokestopping: Complete list, for approval, of penetrations to be sealed, indicating location, construction of penetrated assembly, and identification of penetration seal to be used.

1.3 QUALITY ASSURANCE

A. Testing Requirements: Testing shall have been conducted or witnessed by an independent testing agency acceptable to governing authorities.

1. The listing of the assembly to be used in the current edition of one of the following classification guides will be considered evidence of acceptable testing:
    a. Underwriters Laboratories Inc. “Fire Resistance Directory”
    b. Factory Mutual System “Approval Guide.”
    c. Warnock Hersey “Certification Listings.”

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Firestopping Materials:

1. Manufacturers: Products made by the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
    a. The RectorSeal Corporation; www.rectorseal.com.
    b. Bio Fireshield.
    c. Metacaulk.

d. 3M.

e. Dow Corning Corporation.

f. Flamemaster Corporation.

g. GE Firestop Systems.

h. Tremco Fire Protection Systems (Tremco, Inc.).

2.2 MATERIALS

A. Firestopping Materials: Provide penetration seal assemblies whose fire-resistance ratings have been determined by testing in the configurations required and which have fire-resistance ratings at least as high as that of the fire-rated assembly in which they are to be installed.

1. Provide products which:

a. Allow normal expansion and contraction movement of the penetrating item without failure of the penetration seal.

b. Emit no hazardous, combustible, or irritation by-products during installation or curing period.

c. Do not require special tools for installation

2. Prohibited products: Do not use any of the following products:

a. Safing insulation, unless used in an ASTM E 814-08b tested assembly.

B. Smokestopping: Use any gunnable or pourable joint sealant suitable for the application; use only fully curing types where accessible in the finished work. Provide products which:

1. Allow normal expansion and contraction movement of the penetrating item without failure of the penetration seal.

2. Emit no hazardous, combustible or irritation by products during installation and curing period.

3. Do not require special tools for installation.

C. Labels: Red, permanent marking using the words “Fire-Rated Assembly – Do not disturb – See maintenance instructions” and the testing agency designation, or equivalent as approved by the authority have jurisdiction

PART 3 - EXECUTION

3.1 EXAMINATION

A. Preinstallation Inspection: Inspect all fire and smoke barriers for penetrations of any type; mark or otherwise identify all penetrations indicating action required: 1) repair; 2) firestopping; or 3) smokestopping.

1. Conduct inspection jointly with authorized representative of authority having jurisdiction.

3.2 INSTALLATION

A. Install firestopping materials in exact accordance with manufacturer's instructions and the conditions of the testing; provide all accessory materials required.

B. Remove combustible forming materials, unless they are a required component of the tested assembly.

3.3 PERMANENT IDENTIFICATION OF PENETRATIONS

A. Near fire and smoke barriers, mark each exposed penetration with label identifying it as a fire-stopped or smoke-stopped assembly.

3.4 FIELD QUALITY CONTROL

A. Inspect completed installation for completeness and correct installation.

1. If installed work is to be covered in completed work, inspect prior to covering.

END OF SECTION 072700

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fluid-applied, vapor-permeable membrane air barriers.

B. Related Requirements:

1. Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.2 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.
3. Apply Air Barrier only under conditions approved by the manufacturer in writing.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

2.3 VAPOR-PERMEABLE MEMBRANE AIR-BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are systems similar to, the following:

Basis of Design:

1) Prosoco R-Guard Spray Wrap MVP

2. Physical and Performance Properties:

a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
b. Vapor Permeance: Minimum 10 perms (580ng/Paxsxsq. m ASTM E 96/E 96M.
c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Joint Sealant: Prosoco R-Guard Joint and Seam Filler

C. Liquid applied flashing membrane: Prosoco R-Guard FastFlash.

D. Air Barrier Sealant: Prosoco R-Guard AirDam

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

E. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Plywood Sheathing: Fill joints greater than 1/4 inch (6 mm) with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of fluid air-barrier material at joints.

3.4 FLASHING MEMBRANE INSTALLATION

A. General: Install flashing membrane and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, exterior glazing and window systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply manufacturers recommended liquid applied flashing membrane with a minimum of 6 inches of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 inch (25 mm) of full contact.

F. Fill gaps in perimeter frame surfaces of windows, storefronts, and doors, and miscellaneous penetrations of air-barrier material with system manufacturer’s air barrier sealant..

G. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, strip of

H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

I. Repair punctures, voids, and deficient penetrations.Patch with Flashing Membrane extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with strips Joint Sealant and Flashing Membrane to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.

B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.
   1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 40-mil (1.0-mm) dry film thickness applied in one or more equal coats.

C. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements.

   1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
   2. Continuous structural support of air-barrier system has been provided.
   3. Site conditions for application temperature and dryness of substrates have been maintained.
   4. Maximum exposure time of materials to UV deterioration has not been exceeded.
   5. Application of sealants and Flashing Membrane have complied with minimum requirements.
   6. Termination mastic has been applied on cut edges.
   7. Compatible materials have been used.
   8. Transitions at changes in direction and structural support at gaps have been provided.
   9. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
   10. ALL PENETRATIONS HAVE BEEN SEALED.

B. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

C. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 60 remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 073010 - ICE & WATER SHIELD

PART 1 – GENERAL

1.1 PRODUCT NAME

A. Protecto Wrap Company.

B. Blueskin WP 200.

C. Ice and Water Shield.

1.2 MANUFACTURER

A. Protecto Wrap Company; 1955 South Cherokee Street, Denver, CO 80223. (877) 271-9661, Fax (303) 777-9273. Local distributor: Brazo & Associates, 114 Cobb Road, Panama City Beach, FL 32413.

B. Henry Company.

C. W.R. Grace and Company; Grace Construction Products.

D. Or approved equivalent.

1.3 WARRANTY

A. Product underlayments are to be warranted against defects by manufacturer.

PART 2 – PRODUCT

2.1 PRODUCT DESCRIPTION

A. Underlayment is to be used on sloped roofs beneath metal roofing, and around window and door openings.

2.2 COMPOSITION & MATERIALS

A. Underlayments are 40 mil. cold applied, self-adhering membranes composed of a high strength polyethylene film coated on one side with a layer of rubberized asphalt adhesive and interwound with a disposable release sheet. An embossed, slip resistant surface is provided on the polyethylene.

2.3 PRECAUTIONS & LIMITATIONS

A. Slippery when wet or covered by frost.

B. Consistent with good roofing practice, always wear fall protection when working on roof deck.

C. Release liners are slippery. Remove from work area immediately after membrane application.

D. Do not leave permanently exposed to sunlight. Underlayment should not be left exposed for more than thirty (30) days.

E. Do not fold over the roof edge unless the edge is protected by a drip edge, gutter or other flashing material.

F. Do not install on the chamfered edges of wood plank.

G. Check with the manufacturer of the metal roofing system for any special requirements when used under metal roofing. Do no install directly under roof coverings especially sensitive to corrosion, such as zinc, and copper without providing proper ventilation.

H. Provide proper roof insulation and ventilation to help reduce ice dams and to minimize condensation. Underlayments are to be vapor barriers.

I. Repair holes, fish mouths, tears, and damage to membrane with a round patch of membrane extending past the damaged area 150 mm (6”) in all directions. If fasteners are removed leaving holes in the membrane, it must be patched. The membrane may not self-seal open fastener penetrations.

J. Do not install fasteners through the membrane over unsupported membrane areas on the structural deck, such as over the joints between adjacent structural panels.

2.4 TECHNICAL DATA

A. Applicable Standards:

1. American Society for Testing & Materials (ASTM)

   a. ASTM D 412-06ae1 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

   b. ASTM D 903-98(2004) Standard Test Method for Peel or Stripping of Adhesive Bonds.

   c. ASTM D 1970-08 Standard Specification for Self Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

   d. ASTM D 3767-03(2008) Standard Practice for Rubber-Measurement of Dimensions.

   e. ASTM E 96/E 96M-05 Standard Test Methods for Water Vapor Transmission of Materials.

B. Physical Properties:

1. Underlayments meet the physical properties and performance characteristics indicated:

   a. Color: Gray-Black

   b. Thickness membrane: 40 mil

c. Tensile strength, membrane ASTM D 882-02 A (Die C modified): 1400 psi

d. Elongation, membrane ASTM D 412-06ae1 (Die C modified): 500%

e. Low temperature flexibility, ASTM D 1970-08: Unaffected at -29°F (-20°C)

f. Adhesion to plywood, ASTM D 903-98(2004): 525 N/m (3 lb/in width)

g. Permeance (max), ASTM E 96-05: 2.9 ng/(PA x s x m^2) (0.05 perms max)

h. Material weight installed (max): 1.3 kg/m^2 (0.3 lb/ft^2 max)

i. 2007 Florida Building Code approved.

C. Fire Rating

1. UL Classified Sheathing Material Fire Resistance Classification Design Numbers P225, P227, P230, P237, P259, P508, P510, P512, P514, P701, P711, P717, P722, P723, P732, P734, P736, P742, P803, P814, P818 and P824.

PART 3 – EXECUTION

3.1 SURFACE PREPARATION

A. Install underlayments directly on clean, dry continuous structural deck. Remove dust, dirt, loose nails and excess roofing materials. Protrusions from the deck area must be removed. Decks shall have no voids, damaged or unsupported areas. Repair deck areas before installing the membrane.

B. Prime concrete and masonry surfaces with Grace Construction Products' Bituthene Primer WP-3000 at a rate of 12-15 m2/L (500-600 ft2/gal). Priming is not required for other suitable surfaces provided that they are clean and dry.

3.2 MEMBRANE INSTALLATION

A. Apply underlayment only in fair weather when the air, roof deck and membrane are at temperatures of 5 degrees C (40 degrees F) or higher. Apply roof covering material at temperatures of 5 degrees C (40 degrees F) or higher.

B. Cut the membrane into 3-5 m (10’ – 15’) lengths and reroll loosely. Peel back 300 – 600 mm (1’ – 2’) of release liner, align the membrane and continue to peel the release liner from the membrane. Press the membrane in place with heavy had pressure. Side laps must be a minimum of 90 mm (3.5”), and end laps must be a minimum of 150 mm (6”). For valley and ridge application, peel the release liner from the membrane. Press the membrane in place with heavy hand pressure. Side laps must be a minimum of 90 mm (3.5”), and end laps must be a minimum of 150 mm (6”). For valley and ridge application, peel the release liner, center the sheet over the valley or ridge., drape and press in place. Work from the center of the valley or ridge outward in each direction and start at the low point and work up the roof.

C. Alternatively, starting with a full roll of membrane, unroll a three feet six inches (3’ – 6’) “starter strip”, leaving the release liner in place. Align the membrane and roll in the intended direction o membrane application. Carefully cut the release liner on top of the full roll in the cross direction

being careful not to cut the membrane. Peel back about six inches (6") of the release liner in the opposite direction of the intended membrane application exposing the black adhesive. Hold the release liner with one hand and pull the roll along the deck with the release liner, leaving the starter strip behind. Use the other hand to apply pressure on the top of the roll. Stop frequently to press the membrane in place with heavy hand pressure. When finished with the roll, go back to the beginning, reroll it, and pull the remaining release paper from the material, finishing the installation.

D. Install the membrane so that all laps shed water. Always work from the low point to the high point of the roof. Apply the membrane in valleys before the membrane is applied to the eaves. Following placement along the eaves, continue application of the membrane up the roof. The membrane shall be installed horizontally.

E. Use smooth shank, electroplated galvanized nails for roofing fasteners. Hand nailing will provide a better seal than power activated nailing. If nailing of the membrane is necessary on steep slopes during hot weather, back nail and cover nails by overlapping with the next sheet.

3.3 MAINTENANCE

A. When installed in accordance with manufacturer's recommendations, underlayments will not require maintenance.

END OF SECTION 073010

SECTION 074120 - PREFORMED METAL ROOFING

I. PART 1 - GENERAL

1.1 SUMMARY

A. Preformed metal roofing and related work as specified herein, and as required for a complete and watertight installation. Work under this section includes, but is not limited to:

1. Metal roofing, fascia, and soffits.
2. Flashing and closures.
3. Clips, accessories and fasteners.

Note: Rigid polyisocyanurate roof insulation is specified under Preformed Metal Roofing and in Section 07210-Building Insulation. General contractor shall decide if these materials are to be furnished by the general contractor or the subcontractors so there will be no duplication of the bids.

B. Items Installed:

1. Required sealants as recommended by manufacturer.

1.2 SUBMITTALS

A. Submit complete manufacturer prepared shop drawings for approval in accordance Division 1 requirements. Shop drawings shall show profile and gage of items, location and type of fasteners; location, gage, shape, and methods of attachment of trim; and other details as may be required for a weathertight installation.

1. Do not proceed with manufacture prior to review of shop drawings. Do not use drawings prepared by Architect for shop or erection drawings.
2. Shop drawings shall show methods of erection, elevations, and plans of roof panels, sections, and details, anticipated loads, flashings, roof curbs, vents, sealants, interfaces with materials not supplied, and proposed identification of components parts and their finishes.

B. Submit 3 copies of appropriate color selection materials.

C. Provide Florida Product Approval Number from manufacturer of specific roofing system being submitted and as specified

1.3 QUALITY ASSURANCE

A. Applicable standards:

1. AISC: "Steel Construction Manual," American Institute of Steel Construction.
2. AISI: "Cold Form Steel Design Manual," American Iron and Steel Institute.
3. ASTM A792/ A 792M-08 AZ55: Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated (Galvanized) by the Hot-Dip Process, General Requirements

(Galvalume).

4. Air Infiltration Test: ASTM E1680-95(2003) Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

5. Water Penetration Test: ASTM E1646-95(2003) Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

6. ASTM A 653/ A 653M-08 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

7. UL 2218: Standard for Impact Resistance of Prepared Roof Covering Materials, Class 4 Impact Resistance.

8. Wind Uplift Test: ASTM E 1592-05 Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

B. Manufacturer's qualifications:

1. Manufacturer shall have a minimum of 10 years experience in manufacturing panels of this nature, in a permanent, stationary, indoor production facility.
2. Roofing manufacturer nor the roofing contractor can have filed for bankruptcy within the past five (5) years.

C. The installer shall have been actively installing the type of roofing system defined in these specifications for a minimum of 5 years and be approved by the manufacturer of the system being installed. The installer shall have been actively installing the type of roofing system defined in these specifications for a minimum of 5 years and be approved by the manufacturer of the system being installed. The roofing contractor shall be a Certified Installer for the roof system manufacturer.

D. Design: the preformed metal roof system shall be designed to sustain the specified loads in accordance with governing building codes in the county and state which this project is located in. Components of the preformed metal roof system shall meet the design loads and applied in load combinations as specified in governing building codes, without exceeding the allowable working stresses. Roof, fascia and soffit system shall be designed and installed to withstand wind loads of 140 MPH, with Exposure C, Importance Factor 1.15, and Safety Factor 2.0.

E. When tested in accordance with ASTM E1680-95(2003) and ASTM E1646-95(2003), the panel assembly shall show no more than 0.01 cfm/ft2 of air infiltration at 6.24 psf test pressure and no water leakage at 15 psf test pressure for 15 minutes with a volume spray of 5 gallons per hour.

F. Structural: uniform load capacity shall be determined by testing in accord with the principles of ASTM E1592-05 adapted to testing of formed sheet panels by clarifying specific sections of this standard as follows:

1. Roof test specimens shall be representative of the main body of the roof, free from influence of perimeter conditions. The setup shall be continuous over one or more supports and contain at least 5 panel widths.

2. No roof attachments are permitted at the sides other than the standard gable or rake

condition. For uplift tests, at least one end may simulate an eave condition if at least 12 feet away from the mid-roof clip under evaluation.

3. Roofing panels and accessories shall be production material of the same type and thickness proposed for use on the project.

4. Longitudinal seals or plastic film shall not span any crevice or cracks that may tend to separate under pressure (e.g. plastic films used to seal the chamber must be applied into the side seam of the panel so as to apply a uniform static pressure to the entire cross section of the panel).

5. Design capacity for conditions of gage, span or loading other than those tested may be determined by the interpolation of test results in accord with the AISI cold Formed Steel Manual. Extrapolation outside the range of the tests is not acceptable. In addition to the clarified ASTM E 330-02 testing, the system as installed, shall carry an Underwriters Wind Uplift class 90 rating in addition to and not in lieu of other performance criteria set forth by this specification.

G. Weathertightness: When tested in accord with the principles of NAAMTM-1, the roof system without sealant in the ribs shall show no leakage when exposed to dynamic rain and wind velocity up to 70 mph for 5 minutes.

H. Thermal Cycle test: An assembly consisting of clips, 3 or more panels in width, and spanning 3 or more supports with clips positively loaded to 10 pounds shall resist 1000,000 thermal cycles and show no visible signs of wear from the exterior and erode no more than 25 percent of the panel of clip material from the underside (non-exposed surfaces).

I. The Engineering Study, as well as the Shop Drawings and Design Calculations shall be signed, sealed, and dated by a State of Florida Registered Engineer.

J. Roof system shall be Florida Approved Product in accordance with Florida Department of Community Affairs.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver panels to job site properly packaged to provide against transportation damage.

B. Handling: Exercise extreme care in unloading, storing, and erecting panels to prevent banding, warping, twisting, and surface damage.

C. Storage: Store materials and accessories above ground on well skidded platforms. Store under waterproof covering. Provide proper ventilation to panels to prevent condensation build-up between panels.

1.5 CONDITIONS

A. Pre-roofing Conference.

1. Prior to the installation of the roofing and associated work, meet at the project site with the installer, the installer of each component of associated work, installers of deck or substrate construction to receive roofing work (including mechanical work), the

Architect, and other representatives directly concerned with performance of the work, including (where applicable) insurers, test agencies, product manufacturers, governing authorities, and the owner. Record (by Contractor) the discussions of the conference and the decisions and agreements (or disagreements) reached and furnish a copy of the record to each party attending. Review foreseeable methods and procedures related to the roofing work including, but not necessarily limited to, the following:

a. Review project requirements (drawings, specifications, and other contract documents).

b. Review required submittals.

c. Review status of substrate work (not by the metal roofing installer), including drying, structural loading limitations, and similar considerations.

d. Review required inspection, testing, certifying, and accounting procedures.

e. Review regulations concerning code compliance, environmental protection, health, safety, fire, and similar considerations.

1.6 WARRANTY

A. The contractor shall provide a certified roof inspector, who shall provide the Owner and Architect with written inspection reports regarding the installation of the Preformed Metal Roofing System. A minimum of three (3) site visits shall be required.

B. The manufacturer for the preformed metal roofing shall also furnish to the owner a written guarantee covering the finish of exposed coated metal surfaces against blistering, peeling, cracking, flaking, checking, chipping, rusting, and excessive chalking and color change for a period of 20 years from the date of substantial completion.

1. The Weathertightness Warranty shall be inclusive of all roof components, including ridges, valleys, hips, eaves, rakes, and penetrations.

C. The guarantee shall be submitted through the Architect to the owner.

D. Guarantee/warranty period shall include, but not be limited to, preformed metal roofing, fascias, flashings, closures and trims, fasteners, and accessories.

E. Guarantee/warranty period shall begin on the date of substantial completion for this work.

F. Repairs required, either permanent or temporary, to preformed metal roofing or roof flashings under this guarantee to keep the roof watertight shall be started within 3 days after notice of the need for repairs. Should the contractor fail to make such repairs within a reasonable time period, the owner may have such repairs made and charge the cost to the contractor.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. The 130MPH wind speed pertains to the designated wind zone that the project is located in, per the Florida Building Code Chapter 16. The roofing system shall be designed by the roof manufacturer to withstand 140 MPH wind loads using the most stringent of ASCE 7-05 or UL 580 (2006) Standard for Tests for Uplift Resistance of Roof Assemblies.

2.1 APPROVED MANUFACTURER

A. Preformed metal roofing and fascia shall be standing seam panels with concealed fasteners, to match existing. Panels shall be roll formed in continuous lengths. Furnish and install Berridge Zee-Lock System as manufactured by Berridge Manufacturing Company or architect approved equivalent.

1. Berridge Manufacturing Company.

3. Architectural Metal Systems: 16" Loc Seam/Loc Seam 360 Panel.

4. Peterson Aluminum Corporation: Pac-Clad

5. Englert, Inc.

6. AEP Span (BlueScope Steel Company): Span-Lok HP 16” wide 180-degree Seam

7. Architectural Integrated Metals, Inc.: 16” AIM-Lok Panel.

8. McElroy Metal, Inc.: Maxima ADV 16” wide 180-degree Fold Panel.
1500 Hamilton Road, Bossier, LA 71111 (800) 562-3576; Fax (318) 747-8029.

9. Products of the other manufacturers will be considered for acceptance provided that they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect's approval and complete technical data for evaluation must be submitted in accordance with products and substitutions.

B. Finish to be factory baked on Kynar 500 paint coated steel. Coating to be applied prior to fabrication of roofing components. Finish color shall be selected by TPM.

C. Metal sheets or coils selected for forming into panels must be cut to size before receipt of finish coating or have cut edges specially coated with similar film of same applied finish after being sized. Actual finish and coating method intended for provision must appear on submitted shop drawings.

D. Mechanically seamed side lap with extruded vinyl weatherseal strip.

E. 2” high standing seam side lap

F. UL 90 and UL Fire Resistance tested.

G. ASTM Air and Water resistance tested.

2.2 DESIGN OF SYSTEM

A. Panel shall be designed in accordance with sound engineering methods and practices and in accordance with the latest edition of AISI's "Specification for the Design of Cold formed Steel Structural Members."

B. Roof structure shall be designed with proper recognition for the "floating system" which must exist to have a roof panel that meets expansion and contraction requirements.

C. Wind loads.

1. The wind load on a roof shall be proportioned and applied as an uplift force according to and as recommended by 2007 Florida Building Code.

D. Oil-canning will not be allowed. Manufacturer shall take all necessary precautions and provide additional items as required to prevent oil-canning.

2.3 MATERIALS

A. Roof and fascia panels shall be 12-3/4 inches wide with concealed anchors that resist wind uplift yet permit expansion and contraction with temperature changes. Standing ribs shall have a vinyl insert in snap-on seam cap. Individual panels shall be removable for placement of damaged material. Panels shall be prefinished 50 ksi steel per ASTM A 653/ A 653M-08 in 24 gauge galvanized.

B. Concealed clips shall be not less than 24 gauge galvanized coated, 50,000 psi minimum yield or nonmagnetic stainless steel. Clip design is to be such that it will accommodate expansion and contraction requirements while being anchored securely to structure.

C. Concealed fasteners shall be self drilling, self tapping sheet metal screws of SAE#1022 steel with .0003 inch minimum zinc coating meeting federal Specification QQ-Z325 Type II, or manufacturer approval equal.

D. Roofing panels shall be manufactured in continuous lengths to eliminate perpendicular panel end laps. End laps will not be acceptable in roofing panels.

E. Metal soffit panels shall be flush, smooth panels, 24 gauge pre- finished galvanized steel.

2.4 ROOF SYSTEM ACCESSORIES

A. Fascia, soffit and trim pieces shall be as specified under Article 2.3 herein, and as recommended by manufacturer. Provide all items as required for a complete installation in every respect.

1.

2.5 ROOF UNDERLAYMENT

A. Ice and Water Shield: See specification section 07301.

2.6 ROOF INSULATION

A. Board shall be faced with polymer-coated glass fiber mat facers, both sides. Insulation board shall be installed in two (2) layers. The bottom layer shall be 1-1/2 inches thick, and the top layer shall be 1-1/2 inches thick for a total overall insulation thickness of 3 inches.

B. Subject to compliance with requirements, provide insulation products by one of the following:
   a. Atlas Roofing Corporation (AC Foam)
   b. Hunter Panels.
   c. Owens Corning Insulating Systems, LLC.
   d. R Max Inc.
   e. Johns Manville.

2. PART 3 - EXECUTION

3.1 INSPECTION

A. Areas on which insulation and metal roofing is to be installed shall be completely secured and free of dirt and debris.

B. This contractor shall give written notice to the Architect of defects in substrate that would be detrimental to metal roofing installation prior to start of work.

C. Start of insulation and metal roofing installation shall constitute acceptance of substrates by this contractor.

3.2 METAL ROOFING INSTALLATION

A. Erection of the preformed metal roofing system shall be performed in accordance with the manufacturer's erection drawings.

B. Set bearing plates on surface of insulation board at standing clip angle locations.

C. Install concealed clips on top of bearing plates with self drilling shoulder screws into metal roof deck below. Size and length of screws and bearing plates shall be as recommended by manufacturer.

D. Install concealed backing plates in surface of insulation at locations where panel end laps. The backing plates shall be fastened to the metal deck with self drilling screws at 16 inches on center.

E. Preformed metal roofing, fascia, soffit and trim, shall be watertight and weathertight, lines and angles sharp and true, plain surfaces free form waves and buckles. Workmen shall be experienced in the trade and thoroughly capable of performing the work in accordance with these requirements.

F. Fasteners are to be concealed.

G. Install panels and accessories in strict accordance with the panel manufacturer's written instructions and the approved shop drawings. Attached panels to framing members per the manufacturer's written instructions, providing fixed anchorage or allowing thermal movement where specified on shop drawings.

H. Use appropriate clips, fasteners, braces, and anchors as indicated on the drawings and any other items required for a complete installation and as recommended by manufacturer.

I. Make repairs and perform additional work necessary to provide a roof watertight and acceptable to the Architect and Roofing Manufacturer prior to start of roofing guarantee.

J. The installation shall be designed to safely resist the positive and negative loads.

K. Roof and fascia panels shall be able to support walking loads without excessive distortion or telegraphing of the structural supports. For the maximum span used on the project, panels shall withstand a 250 pound concentrated load applied to a 4 square inch pad located at the center of

the panel flat without buckling of the rib or noticeable permanent distortion of the panel.

L. Roof and fascia panels and flashing attachments shall be designed to accommodate the thermal expansion and contraction of the exterior material through a total of 150 degrees F. temperature change.

M. Factors of safety on design loads to ultimate strength of fasteners shall be as stated in the industry standard for the material into which the fastener in driven.

1. AISI for steel.
2. NFPA for wood.
3. APA for plywood.
4. Allowable holding power for concrete shall be as specified in the building code for the product and grade of concrete involved.

N. Rigid polisocyanurate board roof insulation shall be fastened to the metal roof decking with FM-approved fasteners and insulation plates at the rate of 1 (one) fastener per 6.4 square feet, minimum for 4’x8’ boards, and at rate of 1 (one) fastener per 4 square feet for 4’x4’ boards. Refer to FM Loss Prevention Data Sheet 1-29 for special considerations regarding perimeters and corners of roof.

O. Provide all items as required for a complete installation in every respect.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
NON-STRUCTURAL METAL ROOF SYSTEM

FACILITY DESCRIPTION_____

BUILDING NUMBER:_____

CONTRACTOR

CONTRACTOR:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

OWNER

OWNER:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONSTRUCTION AGENT

CONSTRUCTION AGENT:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

THE NON-STRUCTURAL METAL ROOF SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS WARRANTED BY _____ FOR A PERIOD OF FIVE (5) YEARS AGAINST WORKMANSHIP AND MATERIAL DEFICIENCES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE. THE NON-STRUCTURAL METAL ROOFING SYSTEM COVERED UNDER THIS WARRANTY SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING: THE ENTIRE ROOFING SYSTEM, MANUFACTURER SUPPLIED FRAMING AND STRUCTURAL MEMBERS, METAL ROOF PANELS, FASTENERS, CONNECTORS, ROOF SECUREMENT COMPONENTS, AND ASSEMBLIES TESTED AND APPROVED IN ACCORDANCE WITH UL 580. IN ADDITION, THE SYSTEM PANEL FINISHES, SLIP SHEET, INSULATION, VAPOR RETARDER, ALL ACCESSORIES, COMPONENTS, AND TRIM AND ALL CONNECTIONS ARE INCLUDED. THIS INCLUDES ROOF PENETRATION ITEMS SUCH AS VENTS, CURBS, SKYLIGHTS; INTERIOR OR EXTERIOR GUTTERS AND DOWNSPOUTS; EAVES, RIDGE, HIP, VALLEY, RAKE, GABLE, WALL, OR OTHER ROOF SYSTEM FLASHINGS INSTALLED AND ANY OTHER COMPONENTS SPECIFIED WITHIN THIS CONTRACT TO PROVIDE A WEATHERTIGHT ROOF SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THE SPECIFICATIONS THAT ARE PART OF THE NON-STRUCTURAL METAL ROOFING SYSTEM.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
NON-STRUCTURAL METAL ROOF SYSTEM
(continued)

ALL MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE ASSOCIATED WITH THE NON-STRUCTURAL METAL ROOF SYSTEM COVERED UNDER THIS WARRANTY SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY SHALL COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON _____ AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

_____

(Company President) (Date)

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
NON-STRUCTURAL METAL ROOF SYSTEM
(continued)

THE CONTRACTOR SHALL SUPPLEMENT THIS WARRANTY WITH WRITTEN WARRANTIES FROM THE MANUFACTURER AND/OR INSTALLER OF THE NON-STRUCTURAL METAL ROOFING SYSTEM, WHICH SHALL BE SUBMITTED ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE CONTRACTOR WILL BE ULTIMATELY RESPONSIBLE FOR THIS WARRANTY AS OUTLINED IN THE SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY EXAMPLE.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, SUSTAINED WIND FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).
2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.
3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.
4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.
5. FAILURE OF ANY PART OF THE NON-STRUCTURAL METAL ROOF DUE TO ACTIONS BY THE OWNER TO INHIBIT FREE DRAINAGE OF WATER FROM THE ROOF AND GUTTERS AND DOWNSPOUTS OR ALLOW PONDING WATER TO COLLECT ON THE ROOF SURFACE. CONTRACTOR'S DESIGN SHALL INSURE FREE DRAINAGE FROM THE ROOF AND NOT ALLOW PONDING WATER.
6. THIS WARRANTY APPLIES TO THE NON-STRUCTURAL METAL ROOFING SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.
7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR; AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
II. NON-STRUCTURAL METAL ROOF SYSTEM
(continued)

**REPORTS OF LEAKS AND ROOF SYSTEM DEFICIENCIES SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE, BY TELEPHONE OR IN WRITING, FROM EITHER THE OWNER OR CONTRACTING OFFICER. EMERGENCY REPAIRS TO PREVENT FURTHER ROOF LEAKS SHALL BE INITIATED IMMEDIATELY; A WRITTEN PLAN SHALL BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS ROOF SYSTEM WITHIN SEVEN (7) CALENDAR DAYS. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT SHALL BE STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE NON-STRUCTURAL METAL ROOF SYSTEM REPAIRED OR REPLACED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR.

IN THE EVENT THE CONTRACTOR DISPUTES THE EXISTENCE OF A WARRANTABLE DEFECT, THE CONTRACTOR MAY CHALLENGE THE OWNER'S DEMAND FOR REPAIRS AND/OR REPLACEMENT DIRECTED BY THE OWNER OR CONTRACTING OFFICER EITHER BY REQUESTING A CONTRACTING OFFICER'S DECISION UNDER THE CONTRACT DISPUTES ACT, OR BY REQUESTING THAT AN ARBITRATOR RESOLVE THE ISSUE. THE REQUEST FOR AN ARBITRATOR MUST BE MADE WITHIN 48 HOURS OF BEING NOTIFIED OF THE DISPUTED DEFECTS. UPON BEING INVOKED, THE PARTIES SHALL, WITHIN TEN (10) DAYS, JOINTLY REQUEST A LIST OF FIVE (5) ARBITRATORS FROM THE FEDERAL MEDIATION AND CONCILIATION SERVICE. THE PARTIES SHALL CONFER WITHIN TEN (10) DAYS AFTER RECEIPT OF THE LIST TO SEEK AGREEMENT ON AN ARBITRATOR. IF THE PARTIES CANNOT AGREE ON AN ARBITRATOR, THE CONTRACTING OFFICER AND THE PRESIDENT OF THE CONTRACTOR'S COMPANY WILL STRIKE ONE (1) NAME FROM THE LIST ALTERNATIVELY UNTIL ONE (1) NAME REMAINS. THE REMAINING PERSON SHALL BE THE DULY SELECTED ARBITRATOR. THE COSTS OF THE ARBITRATION, INCLUDING THE ARBITRATOR'S FEE AND EXPENSES, COURT REPORTER, COURTROOM OR SITE SELECTED, ETC., SHALL BE BORNE EQUALLY BETWEEN THE PARTIES. EITHER PARTY DESIRING A COPY OF THE TRANSCRIPT SHALL PAY FOR THE TRANSCRIPT. A HEARING WILL BE HELD AS SOON AS THE PARTIES CAN MUTUALLY AGREE. A WRITTEN ARBITRATOR'S DECISION WILL BE REQUESTED NOT LATER THAN 30 DAYS FOLLOWING THE HEARING. THE DECISION OF THE ARBITRATOR WILL NOT BE BINDING; HOWEVER, IT WILL BE ADMISSIBLE IN ANY SUBSEQUENT APPEAL UNDER THE CONTRACT DISPUTES ACT.

A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

MANUFACTURER'S TWENTY (20) YEAR WARRANTY
FOR NON-STRUCTURAL METAL ROOFING

PROJECT DESCRIPTION AND LOCATION (Include Bldg. No.):_____

CONTRACTOR:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

OWNER:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONSTRUCTION AGENT:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

THE ABOVE FACILITY IS WARRANTED BY_____ FOR A PERIOD OF TWENTY (20) YEARS AGAINST LEAKAGE. THE STANDING-SEAM METAL ROOFING SYSTEM COVERED UNDER THIS WARRANTY SHALL INCLUDE THE ENTIRE ROOFING SYSTEM INCLUDING THE METAL ROOF PANELS; ALL ACCESSORIES AND TRIM; INCLUDING PENETRATIONS SUCH AS VENTS, CURBS, GUTTERS AND DOWNSPOUTS; EAVES, RIDGE, HIP, VALLEY, RAKE, GABLE, WALL, OR OTHER ROOF SYSTEM FLASHINGS INSTALLED TO PROVIDE A WEATHERTIGHT ROOF SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THE SPECIFICATIONS THAT ARE PART OF THE RETROFIT STANDING-SEAM METAL ROOFING SYSTEM. ALL LEAKS SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY SHALL COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON _____ AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

_____

(Roofing Manufacturer Company President) (Date)

(SEE REVERSE SIDE FOR SUPPLEMENTAL PROVISIONS AND EXCLUSIONS)

**MANUFACTURER'S TWENTY (20) YEAR WARRANTY
FOR NON-STRUCTURAL METAL ROOFING
(continued)**

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, HURRICANES, TORNADOES, EARTHQUAKES, AND HAIL).
2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.
3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.
4. CORROSION CAUSED BY EXPOSURE TO MARINE (SALT WATER) ATMOSPHERE; CONSTANT SPRAY OF EITHER SALT OR FRESH WATER; CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.
5. FAILURE OF ANY PART OF THE NON-STRUCTURAL METAL ROOFING SYSTEM DUE TO ACTIONS BY THE OWNER TO INHIBIT FREE DRAINAGE FROM THE ROOF AND ALLOW PONDING WATER. CONTRACTOR'S DESIGN SHALL INSURE FREE DRAINAGE FROM THE ROOF AND NOT ALLOW PONDING WATER.
6. THIS WARRANTY APPLIES TO THE NON-STRUCTURAL METAL ROOFING SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.
7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR; AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES, UNLESS OTHERWISE APPROVED IN WRITING BY THE CONTRACTING OFFICER.

RECEIPT OF NOTICE, BY TELEPHONE OR IN WRITING, FROM THE OWNER OR CONTRACTING OFFICER ABOUT LEAKS SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE. EMERGENCY REPAIRS TO PREVENT FURTHER ROOF LEAKS SHALL BE INITIATED IMMEDIATELY AND A WRITTEN PLAN SHALL BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS NON-STRUCTURAL METAL ROOFING SYSTEM. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT SHALL BE STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE NON-STRUCTURAL METAL ROOFING SYSTEM REPAIRED OR REPLACED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR.

A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

MANUFACTURER'S TWENTY (20) YEAR WARRANTY
FOR NON-STRUCTURAL METAL ROOFING
(continued)

FORM 1 – PREFORMED STEEL STANDING SEAM ROOFING SYSTEM COMPONENTS

1. Contract Number:_____
2. Building Number & Location:_____
3. Deck/Substrate Type:_____
4. Slopes of Deck/Roof Structure:_____
5. Insulation Type & Thickness:_____
6. Insulation Manufacturer:_____
7. Vapor Retarder: ( )Yes( )No
8. Vapor Retarder Type:_____
9. Preformed Steel Standing Seam Roofing Description:
   a. Manufacturer (Name, Address, & Phone No.):_____
   _____
   b. Product Name:_____ c. Width:_____ d. Gage:____
   e. Base Metal:_____ f. Method of Attachment:_____
10. Repair of Color Coating:
    a. Coating Manufacturer (Name, Address & Phone No.):_____
    _____
    b. Product Name:_____
    c. Surface Preparation:_____
    d. Recoating Formula:_____
    e. Application Method:_____
11. Statement of Compliance or Exception:_____
    _____
12. Date Roof Completed:_____
13. Warranty Period: From_____ To_____
14. Roofing Contractor (Name & Address):_____
    _____
15. Prime Contractor (Name & Address):_____
    _____

Contractor's Signature_____Date:_____

Inspector's Signature _____Date:_____

END SECTION 07412

SECTION 074213.23 - METAL COMPOSITE MATERIAL COLUMN COVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes metal composite material wall panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Samples for Initial Selection: For each type of metal composite material panel indicated with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal composite material panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal composite material panels, and other manufactured items so as not to be damaged or deformed. Package metal composite material panels for protection during transportation and handling.

B. Unload, store, and erect metal composite material panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal composite material panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal composite material panels to ensure dryness, with positive slope for drainage of water. Do not store metal composite material panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal composite material panels during installation.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal composite material panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate metal composite material panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leak proof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including rupturing, cracking, or puncturing.
    b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL COMPOSITE MATERIAL COLUMN COVERS

A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material column surrounds fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.

1. Products: Subject to compliance with requirements, provide the following;
2. Basis-of-Design Product: Subject to compliance with requirements, comparable product by the following:

a. ALPOLIC Metal Composite Materials

B. Aluminum-Faced Composite Round Column Covers: Formed with 0.020-inch- (0.50-mm-) thick, aluminum sheet facings.

1. Panel Thickness: 2 inch (51 mm).
2. Core: Standard.
3. Exterior Finish: FEVE fluoropolymer.

a. Color: ALPOLIC, PEX Metallic Pewters Stock.

C. Attachment Assembly Components: Formed from extruded aluminum.

D. Attachment Assembly: Manufacturer's standard principle system.

2.2 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system.

B. Panel Accessories: Provide components required for a complete, panel system including trim, clips, sealants, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.

C. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating.

2.3 FABRICATION

A. General: Fabricate and finish metal composite material panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal composite material panel joints with factory-installed captive gaskets or separator strips that provide a reveal and prevent metal-to-metal contact, and that minimize noise from movements.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.4 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. FEVE Floropolymer: AAMA 620. Two-Coat Fluoropolymer containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine columns to be covered and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.

1. Examine to verify that structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal composite material panel manufacturer's written recommendations.

3.3 METAL COMPOSITE MATERIAL PANEL INSTALLATION

A. General: Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal composite material panels.
2. Install screw fasteners in predrilled holes.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete system.

E. Installation: Attach metal composite material column coverts to supports at steel columns with fasteners recommended by manufacturer to achieve performance requirements specified.

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal composite material column covers installation, including accessories.

B. Metal composite material column covers will be considered defective if they do not pass test and inspections.

C. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.

B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.23

SECTION 076000 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section includes the following:

1. Metal counter flashing and base flashing.
2. Metal wall flashing and expansion flashing.
3. Miscellaneous sheet metal accessories.
4. Sealants and bonding agents between components of this Section and between the roof and other materials.
5. Gutters and Downspouts

B. Related Work Specified Elsewhere:

1. Curbs for roof mounted heating and ventilating equipment are included in the Work of Division 15.

C. General: Accessories and items essential for the completeness of the sheet metal installation. Such items, unless otherwise shown on the Drawings or specified, shall be the same kind of materials as the item to which applied. Nails, screws and bolts shall be of the types suited for the purpose intended, and shall be compatible with the metal to which it will contact.

1.2 SUBMITTALS

A. Submit in accordance with Division 1 requirements.

B. Product data, Flashing Sheet Metal and Accessories. Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

C. Shop drawings showing layout, profiles, methods of joining, and anchorage details, including major counterflashings, trim/fascia units, gutters, downspouts and expansion joint systems. Provide layouts at ¼" scale and details at 3 " inch scale.

1.3 QUALITY ASSURANCE

A. Except as otherwise shown on Drawings or specified, the workmanship of sheet metal work, method for forming joints, anchoring, cleating and provisions for expansion shall conform to the standard details and recommendations of the Copper and Brass Research Association; and workmanship shall be of the best quality, in accordance with best trade practice and the recommendations and specifications of the Sheet Metal and Air Conditioning Contractors National Association, Inc.

B. Where pre-engineered manufactured systems are specified, other field fabricated or shop fabricated substitutions will not be accepted.

1.4 PROJECT CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The type and locations of the various kinds, gages, thickness and finish of sheet metal to be used is specified hereinafter under the individual items. Where sheet metal is indicated on Drawings and kind of metal is not definitely specified, galvanized steel shall be provided.

B. Galvanized Steel: ASTM A792/A 792M-08 AZ55, G-90, .025 inches thick (24 gauge) minimum except as otherwise indicated. Twenty (20) year warranty on finish of sheet metal and five (5) years on installation.

C. Fabrication Reglets and Counterflashings: Shall be as manufactured by the Fry Reglet Corporation, 12342 Hawkins Street, Santa Fe Springs, CA 90670, (800) 237-9773.

1. Type: Shall be type “SM” made of 24 gauge galvanized steel with slots for expansion, punched approximately 16 inches o.c. for surface mounting. Provide factory fabricated mitered corners.
2. Provide suitable screws and washers for mounting to wall, similar to those indicated on the Drawings.
3. Provide Fry “Springlock” counterflashing.
4. Products of other manufacturers will be acceptable providing they meet or exceed the quality specified, and they can provide products of the type, size and function required.
    a. Architectural Products Company, Hebron, KY, (800) 837-1001.

D. Shop fabricated galvanized steel flashings shall be fabricated to configurations indicated on the Drawings.

1. Fabricate from nominal 24 gauge galvanized steel (.025 inches thick) sheet.
2. Fascia shall be provided with concealed splice plates for joints 10 feet on center.
3. Fascias and Flashing: Products of Architectural Products Co., Hebron, KY, and other manufacturers will be considered providing they meet or exceed the quality specified, and they can provide products of the size, type and function required.

E. Roofing Expansion Joints: as approved by the roofing manufacturer.

F. Gutters and Downspouts

1. Fabricate from nominal 22 gauge galvanized steel.

2. Gutters shall be fabricated with expansion joints spaced and as recommended by SMACNA.

3. Downspouts shall be fabricated with elbows, fittings, adapters and brackets as required for a complete installation in every respect.

4. All Gutters are to be rectangular with “Kynar 500” paint finish, color as selected by the TPM.

2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Solder: For use with steel or copper, provide 50-50 tin/lead solder (ASTM B32-08), with rosin flux.

B. Solder: For use with stainless steel, provide 60 - 40 tin/lead solder (ASTM B32-08), acid-chloride type flux, except use rosin flux over tinned surfaces.

C. Fasteners: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish or exposed heads with material being fastened.

D. Bituminous Coating: SSPC - Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

E. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section “Joint Sealers”.

F. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

G. Reglets: Metal of type and profile indicated, compatible with flashing indicated, noncorrosive.

H. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

I. Gutter and Conductor-Head Guards: 20-gage bronze or nonmagnetic stainless steel mesh or fabricated units, with selvaged edges and noncorrosive fasteners. Select materials for compatibility with gutters and downspouts.

2.3 FABRICATION

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA “Architectural Sheet Metal Manual” and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, nonexpansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

PART 3 - EXECUTION

3.1 INSPECTION

A. General: The Installer must examine substrates and conditions under which metal flashings will be installed, and notify Contractor in writing of unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 PREPARATION

A. Separate dissimilar metals from each other by painting each metal surface in areas of contact with a heavy application of bituminous coating.

3.3 INSTALLATION

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely inplace by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams that will be permanently watertight and weatherproof.

B. Install work with provisions for thermal expansion of flashings, gravel stops, and other items exposed for more than 15 feet continuous length. Maintain a watertight installation at expansion seams. Locate expansion seams where shown, or if not shown, in conformance with applicable recommendations of "Architectural Sheet Metal Manual" by SMACNA.

C. Sheet metal work shall be watertight and weathertight; lines, arises and angles sharp and true; plain surfaces free from waves and buckles. Workmen shall be experienced in the trade and thoroughly capable of performing the Work in accordance with these requirements.

D. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, finish reglets to trades of masonry work, for installation as work of Division 4 sections.

E. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

F. Install continuouse gutter guards on gutters, arranged as hinged units to swing open for cleaning gutters. Install “beehive”type strainer guard at conductor heads, removable for cleaning downspouts.

G. Prefabricated Reglets and Counterflashings.

1. Apply continuous bead of sealant or plastic cement to back of type “SM” reglet.
2. Install Type “SM” reglet on surface of flexible flashing on wall parallel to roof slope with fasteners furnished by manufacturer. Fill top groove with sealant and tool tight against wall with surface of sealant sloping to outside.
3. Position counterflashing into reglet and “snap” into place against wall flashing.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION 076000

SECTION 079000 - JOINT SEALERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Preparing sealant substrate surfaces.

B. Sealant and joint backing.

1.2 SYSTEM DESCRIPTION

A. System performance to achieve moisture and air tight joint seals.

1.3 SUBMITTALS

A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and colors available.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

PART 2 - PRODUCTS

2.1 SEALANTS

A. Acrylic Emulsion Latex (Type 7): ASTM C920-08, Grade NS, Class 12 ½", Use NT; Single component, solvent release, non-skinning, non-sagging; color as selected..

B. Butyl Sealant (Type 8): ASTM C920-08, Grade NS, Class 12 ½", Use NT; single component, solvent release, non-skinning, non-sagging, color as selected.

C. Polysulfide Sealant (Type 2): ASTM C920-08, Grade NS, Class 25, Use NT, M, A & O; single component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging, color as selected.

1. Elongation Capability25 percent
2. Service Temperature Range -40 to 180 degrees F
3. Shore A Hardness Range 20 to 35

D. Polyurethane Sealant (Type 1): ASTM C920-08, Grade NS, Class 25, Use NT, M, G, A & O; multi component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging type; color as selected.

1. Elongation Capability 25 percent
2. Service Temperature Range -40 to 180 degrees F
3. Shore A Hardness Range 20 to 35

E. Polyurethane Sealant (Type 5): ASTM C920-08, Grade NS, Class 25, Use T, M, A & O; multi-component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, self-levelling type; color as selected.

1. Elongation Capability 25 percent
2. Service Temperature Range -40 to 180 degrees F
3. Shore A Hardness Range 20 to 35

F. Silicone Sealant (Type 4): ASTM C920-08, Grade NS, Class 25, Use NT, M, G, A & O; single component, solvent curing, non-sagging, non-staining, non-bleeding; color as selected.

1. Elongation Capability 50 percent
2. Service Temperature Range -65 to 180 degrees F
3. Shore A Hardness Range 15 to 35

G. Silicone Sealant (Type 6): ASTM C920-08, Grade NS, Class 25, single component, fungus resistant, chemical curing, non-sagging, non-staining, non-bleeding; color as selected.

1. Elongation Capability 25 percent
2. Service Temperature Range -65 to 180 degrees F
3. Shore A Hardness Range 15 to 25

H. Silicone Sealant (Type 3): ASTM C920-08, Grade NS, Class 25, Use NT, G, A & O; single component, acidic curing, non-sagging, non-staining, non-bleeding; color as selected.

1. Elongation Capability 25 percent
2. Service Temperature Range -65 to 180 degrees F
3. Shore A Hardness Range 15 to 25

2.2 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: ASTM D 1056-07; round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that substrate surfaces and joint openings are ready to receive work.

B. Remove loose materials and foreign matter which might impair adhesion of sealant.

C. Verify that joint backing and release tapes are compatible with sealant.

D. Perform preparation in accordance with ASTM C 1193-05a for solvent release, ASTM C 1193-05a for solvent release sealants.

3.2 INSTALLATION

A. Clean and prime seal joints in accordance with manufacturer's instructions.

B. Install sealant in accordance with manufacturer's instructions.

C. Measure joint dimensions and size materials to achieve required 2:1 width/depth ratios.

D. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

E. Install bond breaker where joint backing is not used.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave.

3.3 SCHEDULE

A. Exterior and Interior Sealants:

1. Significant movement, panel and expansion joints, type 1.
2. Minimal movement, reglet and perimeter joints, type 1 & 2.
3. Paving, type 5.

B. Glazing Sealants.

1. Structural, type 4.
2. Non-structural, type 2, 3 & 4.

C. Interior.

1. General, type 7.
2. Special.
    a. Bathrooms, type 6.

b. Exposed Acoustical, type 7.

c. Non-exposed Acoustical, type 8.

END OF SECTION 079000

SECTION 081100 - STEEL DOORS AND FRAMES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes steel doors and frames.

B. Related Section: The following Sections contain requirements that relate to this Section:

1. Division 4 Section “Unit Masonry” for building anchors into and grouting frames in masonry construction.
2. Division 8 Section “Flush Wood Doors” for solid-core wood doors installed in steel frames.
3. Division 8 Section “Door Hardware” for door hardware and weatherstripping.
4. Division 8 Section “Glazing” for glass in steel doors and sidelights.
5. Division 9 Section “Painting” for field painting primed doors and frames.

1.3 PERFORMANCE REQUIREMENTS

A. All exterior hollow metal doors and frames shall be Florida Approved Products in accordance with Florida Department of Community Affairs.

1.4 SUBMITTALS

A. Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. For Review:

1. Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance profiles, and finishes.
2. Shop Drawings showing fabrication and installation of steel doors and frames. Including details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items. Shop Drawings shall clearly identify which frames, if any, will require on-site welding, and what the manufacturer requires for a certified welder to accomplish the welding.
3. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.

4. Indicate coordination of glazing frames and stops with glass and glazing requirements.

C. For Information Only:

1. Oversize Construction Certification: For door assemblies required to be fire-rated and exceeding limitations of labeled assemblies, submit certification of a testing agency acceptable to authorities having jurisdiction that each door and frame assembly has been constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

D. For Closeout: Submit shop drawing and product data in accordance with Division 1 Section for closeout.

E. Provide Florida Product Approval Number from manufacturer of specific door and frame units being submitted and as specified.

1.5 QUALITY ASSURANCE

A. Provide doors and frames complying with ANSI A250.8-2003 “Recommended Specification for Standard Steel Doors and Frames” and as specified. Fire-Rated Door Assemblies: Units that comply with ANSI/NFPA 80-1999, are identical to door and frame assemblies tested for fire-test-response characteristics, and are labeled and listed by UL Wamock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rising rating of 450 deg F maximum in 30 minutes of fire exposure.

B. Wherever on-site welding of steel frames may be required, welding shall be performed by a factory-certified welder from the supplier of the steel frames. Contractor shall submit certification documentation of the welder to the TPM for review and approval prior to the work being done.

1.6 DELIVERY, STORAGE, HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4 inch high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum ¼ inch spaces between stacked doors to promote air circulation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amweld Building Products; Division of Ark II Manufacturing, LLC.
2. Ceco Door (ASSA ABLOY Door Group).
3. Curries Company (ASSA ABLOY Door Group).
4. Mesker Door, Inc.
5. Pioneer Industries.
6. Windsor Republic Doors: Steelcraft.

2.2 MATERIALS

A. Supports and Anchors: Fabricated from not less than 0.0478 inch (1.2 mm) thick steel sheet; 0.0516 inch (1.3 mm) thick galvanized steel where used with galvanized steel frames.

B. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153/ A 153M-05, Class C or D as applicable.

C. Asphalt Coating: SSPC paint 12 formulated asbestos free.

2.3 DOORS

A. Steel Doors: Provide 1 ¾ inch (44 mm) thick doors of materials and ANSI A250.08 levels and models specified below, or as indicated on Drawings or schedules:

1. Exterior Doors: Shall be constructed of Grade A60 Galvannealed Steel, minimum.

B. Door Louvers: Provide louvers according to SDI 111C for interior doors where indicated, with blades or baffles formed of 0.0239-inch (0.6 mm) thick galvanized cold-rolled steel sheet set into minimum 0.0359-inch (0.9 mm) thick steel frame.

2.4 FRAMES

A. Provide metal frames for doors, windows and other openings, according to ANSI/SDI 100, and of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16 gage, 0.0598-inch (1.9 mm) thick galvanized steel sheet.

1. Fabricate frames with mitered or coped and continuously welded corners.
2. Fabricate frames of Grade A60 Galvannealed Steel Sheet, minimum.

B. Door Silencers: Drill stops to receive and provide 3 rubber silencers on strike jambs of single door frames and 2 silencers on heads of double door frames.

C. Plaster Guards: Provide minimum 0.0179-inch (0.45 mm) thick steel plaster guards or mortar boxes at back of hardware cutouts to close off interior of openings.

D. Glazing Beads: On frame assemblies that incorporate glazed openings, the frame shall be provided with glazing beads designed to receive the glazing materials specified. The glazing beads designed to receive the glazing materials specified. The glazing beads shall be butted at the corners. Glazing beads shall be of Snap-On or Screw-Applied design. Glazing is to be laminated impact resistant glass see section 08800.

2.5 FABRICATION

A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assembly units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI 250.08 requirements.

1. Internal Construction: One of the following manufacturer's standard core material according to SDI standards:

   a. At Interior Openings:

      1) Resin-impregnated paper honeycomb.

      2) Rigid polyurethane conforming to ASTM C 591-08.

      3) Rigid polystyrene conforming to ASTM C 578-08.

   b. At Exterior Openings:

      1) Rigid polyurethane conforming to ASTM C 591-08.

      2) Rigid polystyrene conforming to ASTM C 578-08.

2. Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than ¼ inch (6.4 mm) between non-fire-rated pairs of doors. Not more than ¾ inch (19 mm) at bottom.

   a. Fire Doors: Provide clearances according to NFPA 80.

B. Fabricate exposed faces of doors and panels from only cold-rolled steel sheet.

C. Tolerances: Comply with SDI 117-2000 "Manufacturing Tolerances for Standard Steel Doors and Frames.

D. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold or hot-rolled steel sheet. At exterior doors, close top and bottom edges of doors flush as an integral part of door construction or by addition of minimum 0.0635-inch thick galvanized steel channels, with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.

F. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A 115 Series specifications for door and frame preparation for hardware.

G. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface applied hardware may be done at Project site.

H. Location hardware as follows:

1. SREF:

a. Doors Accommodating Children with Disabilities: Mount opening devices on doors 34 inches above floor.

b. Mount panic devices located no less than 30 inches no more that 44 inches AFF.

I. Glazing Stops: Minimum 0.0359 inch (0.9 mm) thick steel or 0.040 (1 mm) thick aluminum.

1. Provide nonremovable stops on secure side of interior doors for glass, louvers, and other panels in doors.

2. Provide screw-applied, removable, glazing beads on inside of glass, louvers, and other panels in doors and windows.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's " Metal Finishes Manual" for recommendations relative to applying and designating finishes. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.

B. Apply primers and organic finishes to doors and frames after fabrication.

2.7 GALVANIZED STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminates. After cleaning, apply a conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and applying galvanizing repair paint specified below to comply with ASTM A 790/A 790M-08.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 80 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20, Type II.

B. Factory Priming for Field-Painted Finish: where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.

1. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

2.8 STEEL SHEET FINISHES

A. Surface preparation: solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP8 (Pickling).

B. Pretreatment: Immediately after surface preparation, apply a conversion coating of type suited to organic coating applied over it.

C. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3 – EXECTUTION

3.1 INSTALLATION

A. Install steel doors, frames and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provision of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. In new masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Provide masonry T-shaped anchors.

2. Install fire-rated frames according to NFPA 80.

C. Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI 250.08.

1. Fire-Rated Doors: Install with clearances specified in NFPA 80.

3.2 ADJUSTING AND CLEANING

A. Prime Coat Touch Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section “Flush Wood Doors”.
4. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
5. Division 08 Section "Door Hardware".
6. Division 08 Section "Access Control Hardware".
7. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
7. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
8. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
9. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

10. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
11. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
12. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
13. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
14. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
15. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
16. TAS-201-94 - Impact Test Procedures.
17. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
18. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
19. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
20. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

A. Informational Submittals:

1. Hurricane Resistant Openings (State of Florida): Within the State of Florida, provide copy of current State of Florida Product Approval as proof of compliance that doors, frames and hardware for exterior opening assemblies have been tested and approved for use at the design pressure level and debris impact resistance requirements specified for the Project.

    a. Hurricane Resistant Components (State of Florida): Within the State of Florida, provide copy of independent, third-party certified listing conforming to ANSI A250.13.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40” above sill) or UL 10C.

1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Smoke Control Door Assemblies: Comply with NFPA 105.

a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

E. Hurricane Resistant Exterior Openings (State of Florida including High Velocity Hurricane Zone (HVHZ): Provide exterior hollow metal doors and frames as complete and tested assemblies, or component assemblies, including approved hardware specified under Section 087100 "Door Hardware", to meet the design pressures, debris impact resistance, and glass and glazing requirements as detailed in the current State of Florida building code sections applicable to the Project.

1. Each unit to bear third party permanent label in accordance with Florida Building Code requirements.

F. Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to ICC 500 (2014/2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

1. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:

1. CECO Door Products (C).
2. Curries Company (CU).
3. Steelcraft (S).

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with

requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer’s thermally enhanced QMax core. Where indicated provide doors fabricated as thermal-rated assemblies with a minimum thermal rating of 0.41 BTU/hr-ft2-F.
3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. Curries Company (CU) - QMax Core - 707 Series.

2.4 SPECIAL FUNCTION HOLLOW METAL DOORS

A. Bullet Resistant Door Assemblies: Subject to the same compliance standards and requirements as standard hollow metal doors, provide manufacturer's custom bullet resistant internal door construction tested in accordance with U.L. Test Standard 752. Fabricate with concealed armor plate construction, 1-3/4" thickness, in the steel gauge required to meet indicated ballistic rating. Furnish as a complete unit with factory welded frame and approved listed hardware.

1. Provide bullet resistant assemblies with UL752 Level 3.

2. Manufacturers Basis of Design:

    a. CECO Door Products (C) - Armorshield Series.
    b. Curries Company (CU) - 737 Series.

2.5 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
3. Manufacturers Basis of Design:

    a. Curries Company (CU) - M Series.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
3. Manufacturers Basis of Design:

    a. Curries Company (CU) - CM Series.
    b. Curries Company (CU) - M Series.

D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.6 SPECIAL FUNCTION HOLLOW METAL FRAMES

A. Bullet Resistant Frame Assemblies: Subject to the same compliance standards and requirements as standard hollow metal frames, provide where indicated manufacturer tested bullet resistance frame as part of a complete door and frame system. Fabricate bullet resistance frames from minimum 12 gauge steel with fully welded construction.

1. Manufacturers Basis of Design:

    a. CECO Door Products (C) - Armorshield Series Frames.
    b. Curries Company (CU) - 737 Series Frames.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
4. Hurricane Opening Anchors: Types as tested and required for indicated wall types to meet specified design pressure and impact rating criteria.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.8 LOUVERS

A. Metal Louvers: Unless otherwise indicated provide louvers to meet the following requirements.

1. Blade Type: Vision proof inverted V or inverted Y.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.9 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator’s shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.10 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.11 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

    a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.

8. Electrical Thru-Wiring: Provide hollow metal frames receiving electrified hardware with loose wiring harness (not attached to open throat components or installed in closed mullion tubes) and standardized Molex™ plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
10. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on-center and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
        5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

    c. Storm Shelter Openings: Provide jamb, head, and sill anchors in accordance with manufacturer’s certified assembly listings.

11. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
12. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.12 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.

1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

3.5 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION 081113

SECTION 082110 - FLUSH WOOD DOORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory machining for hardware.
4. Cut-outs for door lights and louvers.

1.3 SUBMITTALS

A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. For Review:

1. Product Data: For each type of door. Include details of core and edge construction, trim or openings, and louvers.
    a. Include factory-finishing specifications
2. Shop Drawings: Indicate location, size and hand of each door; elevation of each kind of door's construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
    a. Indicated dimensions and locations of mortises and holes for hardware.
    b. Indicate dimensions and location of cutouts.
    c. Indicate requirements for veneer matching.
    d. Indicate doors to be factory finished and finish requirements.
    e. Indicate fire ratings for fire doors.
3. Samples for Verification as Follows:
    a. Corner sections of doors approximately 8 by 10 inches (200 by 250 mm) with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.
    b. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.

c. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

C. For Closeout: Submit following in accordance with Division 1 Section Closeout.

1. Product data
2. Shop drawings
3. Warranty

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Quality Standard: Comply with the following standard:

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing accordance to NFPA 252.

1. Test Pressure: Test at atmospheric pressure.

1.5 DELIVERY, STORAGE AND HANDLING

A. Protect doors during transit, storage, and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

C. Accept doors on site in manufacturer's packaging, Inspect for damage.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.

1.7 WARRANTY

A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form, signed by manufacturer, Installer, and Contractor, agreeing to repair or provide new doors for defective doors that have warped (bow, cup, or twist) more than ¼ inch in a 42 by 84 inch section, that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch spa, or do not comply with tolerances in referenced quality standard.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

2. Warranty shall be in effect during following period of time after the date of Substantial Completion:

a. Solid-Core Interior Doors: Life of installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flush Wood Doors:

a. Algoma Hardwoods, Inc., Algoma, WI.

b. Eggers Industries, Neenah Division, Neenah, WI.

c. V-T Industries Inc., Holstein, IA.

d. Weyerhaeuser Company, Federal Way, WA.

e. Graham Wood Doors, Mason City, IA.

f. Chappell Door Company, Washington, OH.

g. Oshkosh Door Company, Oshkosh, WI.

h. Marshfield Door Systems, Inc., Marshfield, WI.

DOOR CONSTRUCTION, GENERAL

A. Doors for Transparent Finish: Comply with following requirements:

1. Grade: Custom (Grade A faces).
2. Faces: Red oak, plain sliced.

2.2 SOLID-CORE DOORS

A. Particleboard Cores: comply with the following requirements:

1. Particleboard: ANSI A208.1, Grade LD-2
2. Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

B. Fire-Rated Doors: Comply with the following requirements:

1. Construction: construction and core specified above for type of face indicated door manufacturer's standard mineral-core construction as required to provide fire rating indicated.
2. Edge Construction: At hinge stiles, provide manufacturer's standard laminated edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.

2.4 LIGHT FRAMES

A. Hollow Metal Frames for Light Openings as follows:

1. Galvanized hollow metal, lip type, with mitered corners.

B. Metal Louvers:

1. Blade type, vision-proof, inverted "V", as indicated on drawings.

2.5 FABRICATION

A. Fabricate flush wood doors in sizes indicated for Project site fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-rated doors.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-e. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard's requirements for factory finishing.

B. Stain finish wood doors at factory.

C. Transparent finish: Comply with requirements indicated for grade, finish system, staining effect, and sheen.

1. Grade: Custom

2. Finish: Comply with following:

a. AWI System TR-6 catalyzed polyurethane.

3. Staining: Color as selected by Architect and Owner from manufacturer's full color range.

4. Sheen: Satin (low luster).

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examination installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware".

B. Manufacturer's Written Instructions: Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHO-WHDS-3 and following SREF. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. SREF:

a. Doors Accommodating Children with Disabilities: Mount opening devices on doors 34 inches above floor.

b. Mount panic devices located no less than 30 inches nor more than 44 inches AFF.

2. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

3.3 ADJUSTING AND PROTECTING

A. Operation: Rehang or provide new doors that do not swing or operate freely.

B. Finished Doors: Refinish or provide new doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage and deterioration at time of Substantial Completion.

D. Adjust door for smooth and balanced door movement. Adjust closer for full closure.

END OF SECTION 08211

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior Impact Resistant and Blast Mitigating Storefront System.
2. Storefront framing for window walls.
3. Exterior manual-swing entrance doors and door-frame units.
4. Projected Windows

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed casements, entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

D. Projected Window Hardware:

1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E 405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.

a. Type and Style: **As selected by Architect from manufacturer's full range of types and styles**.

2. Hinges: **Non-friction type, not less than two per sash**.
3. Lock: **Lift-type throw, cam-action lock with keeper**.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of storefront systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances, storefronts and projected windows shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

B. Structural Loads:

1. Wind Loads: As indicated on Drawings. See Sheet S001

C. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller

a. Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.

b. Perpendicular to Plane of Wall: No greater than 1/175 times span, for spans less than 11 feet 8-1/4 inches (3.6 m).

D. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa)

2. Entrance Doors:

a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. (5.08 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

G. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
2. Maximum Water Leakage: According to AAMA 501.**1** Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

H. Seismic Performance: Aluminum-framed projected windows, entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

I. Energy Performance: Certify and label energy performance according to NFRC.

J. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: YKKAP YHS 50 FS Series or equal products from other manufacturers.

C. Source Limitations: Obtain all components of aluminum-framed projected windows, entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Center
4. Finish: Clear Anodizing Aluminum

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
d. Structural Profiles: ASTM B 308/B 308M.

2.4 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch-(3.2-mm-)thick, extruded-aluminum tubular rail and stile members. Mechanically fasten

corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

2. Door Design: Medium stile; 3-1/2-inch (88.9-mm) nominal width
3. Glazing Stops and Gaskets: Beveled

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

2.6 GLAZING

A. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

B. Glazing Sealants: As recommended by manufacturer.

2.7 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

E. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: Medium bronze

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.

2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install casements, aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
    c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).

4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

END OF SECTION 084113

SECTION 085200 OUT-SWINGING CASEMENT ALUMINUM IMPACT WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes Thermally Broken out-swinging casement Impact rated aluminum-framed windows, with intermediate structural mullions.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 4 Section "Unit Masonry."
2. Division 7 Section “Joint Sealers” for window units
3. Division 8 Section “Glazing” for Insulated Glass.
4. Division 9 Section "Tile" for marble window stools.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure. Windows .capable of complying with performance requirements indicated, based on testing manufacturer's standard window assemblies representing types, grades, classes, and sizes of those specified, and that are of minimum test size required by AAMA/WDMA 101/I.S.2/NAFS. Testing shall be performed by a qualified independent testing agency.

B. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in AAMA 101 for air infiltration, water penetration, and structural performance for type, grade, and performance class of window units required. Where required design pressure exceeds the minimum for the specified window grade, comply with requirements of AAMA 101, Section 3, "Optional Performance Classes," for higher than minimum performance class.

1. Air-Infiltration Rate for Operating Units: Not more than 0.37 cfm/ft. of operable sash joint for an inward test pressure of 1.57 lbf/sq. ft.
2. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 15 percent of the design pressure.

3. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:

   a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

      1) Basic Wind Speed: as indicated on Drawings

      2) Importance Factor: as indicated on Drawings

      3) Exposure Category: as indicated on Drawings

   b. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch, whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.

4. Windborne-Debris Resistance: In addition to all other performance criteria specified here-in including Prior Approval, provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1996-99 and testing information in ASTM E 1996-03 large missile – positive and negative or AAMA 506-2000 and requirements of authorities having jurisdiction. Window manufacturer's Miami/Dade certification to protocols PA-201, PA-202 & PA-203 and N.O.A. (Notice of Acceptance) numbers will also serve as proof of compliance with Impact requirements.

5. Window units shall be sized such that there is a total of 5% NSF (minimum) free air area provided by all windows within the individual classroom.

6. The operation of the windows shall be manually opened without the use of roto-operator. Windows shall have single interconnected locking handle that operates a multiple point latching system, as well as stainless steel key-release limit stop that shall restrict the windows from opening more than 6 inches.

C. Windows System shall be a Florida Approved Product in accordance with Florida Department of Community Affairs.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data: For each type of aluminum window required, including the following:

1. Construction details and fabrication methods.

2. Profiles and dimensions of individual components.

3. Data on hardware, accessories, and finishes.

4. Recommendations for maintaining and cleaning exterior surfaces.

C. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details.

1. Layout and installation details, including anchors.
2. Elevations at 1/4 inch = 1 foot scale and typical window unit elevations at 3/4 inch = 1 foot scale.
3. Full-size section details of typical composite members, including reinforcement and stiffeners.
4. Location of weep holes.
5. Panning details.
6. Hardware, including operators.
7. Glazing details.
8. Accessories.

D. Samples for initial color selection on 12-inch-long sections of window members. Where finishes involve normal color variations, include Sample sets showing the full range of variations expected.

E. Samples for Verification: The TPM reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.

F. Provide Florida product Approval Numbers from manufacturer of specific window units being submitted and as specified.

G. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated based on comprehensive testing of current window units within the last 5 years. Test results based on use of down-sized test units will not be accepted.

H. Engineered Structural Calculations: Stamped, sealed and certified structural calculations prepared by a structural engineer registered in the State of Florida shall be submitted prior to fabrication of any product or components, certifying that the windows and any structural components incorporated into the window system will withstand the specified wind loads and design pressures. Components shall include, but are not necessarily limited to anchors, including any sub frames, structural mullions and anchorage fasteners and locations. Preparation of structural calculations may be made after architect's review and approval of window sizes, layouts and configurations, however final approval of submittals shall not be granted nor release of materials for fabrication until all structural calculations are received and reviewed by the architect.

I. Product Schedule: Use same designations indicated on Drawings.

J. Maintenance data at Job Close-out.

1.5 QUALITY ASSURANCE

A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.

B. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

C. Single-Source Responsibility: Obtain aluminum windows from one source and by a single manufacturer.

D. Product Options: The Drawings indicate sizes, profiles, dimensional requirements, and aesthetic effects of aluminum windows and are based on the specific window types and models indicated. Other aluminum window manufacturers whose products have equal performance characteristics may be considered provided deviations in size, profile, and dimensions are minor and do not alter the aesthetic effect. Refer to Division 1 Section "Substitutions."

E. Preinstallation Conference: Conduct conference at Project site

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty signed by aluminum window manufacturer in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Failure to meet performance requirements.
    b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
    c. Faulty operation of movable sash and hardware.
    d. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
    e. Failure of insulating glass or delamination of laminated Impact units.

2. Warranty Period:

    a. Window: Three (3) years from date of Substantial Completion.
    b. Glazing: Five (5) years from date of Substantial Completion.
    c. Metal Finish: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
   1. Winco
   2. Peerless Products Inc.
   3. Efco
   4. Traco
   5. Graham

B. All other manufacturers desiring to bid this project shall submit to the architect for review at least 10 days prior to the published bid date, complete technical and descriptive information, impact testing certifications, details and a full size representative sample of the proposed product. Approval to bid any proposed substitute window(s) will be issued in the form of a written addendum only, **NO VERBAL APPROVALS WILL BE ISSUED OR CONSIDERED.**

2.2 ALUMINUM WINDOWS

A. Window Type(s): Out-swinging Casement, Thermally Broken, Impact rated as indicated on Drawings.
   1. Comply with AAMA/WDMA 101/I.S.2/NAFS.

   2. Out-swinging Casement: Performance Class and Grade: Minimum AP-AN 75/90 for AAMA Gateway test size requirements; 60 PSF design pressure for Impact test size of 72" x 72"
   3. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a minimum CRF of 45 for frame & 51 glass.
   4. Thermal Transmittance: Provide aluminum windows with a whole-window, U-factor maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to AAMA 1503.
      a. U-Factor: 0.64 Btu/sq. ft. x h x deg F or less.

B. Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and not less than 0.062 inch thick at any location for main frame and sash members.

C. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
   1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, noncorrosive, pressed-in, splined grommet nuts.

2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

D. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633-07; provide sufficient strength to withstand design pressure indicated.

E. Weatherstripping: Provide weatherstripping of dual-durometer neoprene leaf or bulb gasket.

F. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating. Comply with Division 7 Section "Joint Sealants" of these Specifications for selection and installation of sealants.

G. Finish: Clear Anodized Aluminum.

Refer to Section 1.3 Performance Requirements for specific Hurricane Impact ratings and requirements.

2.3 GLAZING

A. Glass and Glazing Materials: Refer to Division 8 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

B. Glass Clear, Impact resistant insulating laminated glass units, complying with Division 8 Section "Glazing." Laminated Glass make-up shall be not less that two lites of 1/8” annealed glass with a .090” thick “Saflex” interlayer as manufactured by Solutia or equal.

C. Glazing System Manufacturer's standard factory-glazing system. Refer to Division 8 Section "Glazing" for any additional information or clarifications.

2.4 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended. Refer to section 1.3B.6.

2.5 INSECT SCREENS

A. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners and removable PVC spline/anchor concealing edge of frame.

1. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
2. Finish: Match aluminum window members.

B. Glass-Fiber Mesh Fabric: 18-by-16 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; in the following color. Comply with ASTM D 3656-07.

1. Mesh Color: Charcoal gray.

2.6 ACCESSORIES

A. General: Provide manufacturer's standard accessories that comply with indicated standards.

B. Insect Screens: Provide insect screens for each operable exterior sash or ventilator. Locate screens on inside of window sash or ventilator, depending on window type. Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches.

1. Screen Frames: Fabricate frames of tubular-shaped, extruded- or formed-aluminum members of 0.040-inch-minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Finish frames to match window units.

C. Weatherstripping: Provide dual-durometer leaf or bulb gasket.

2.7 FABRICATION

A. Fabricate aluminum windows that are reglazable without dismantling the master or ventilator framing. Windows shall be a minimum of 3.25” in total depth and shall incorporate a fully operable sash. All primary member metal thickness shall be not less than .062”.

B. Weather Stripping: Provide full-perimeter weather stripping for each operable sash.

C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior the window and sub-sill system.

D. Mullions: Provide mullions and cover plates where required as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

E. Sub-Sills: Provide sub-sills for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- thick extruded aluminum. Finish to match window units. Provide end dams at the ends of all sub-sills, sealed with an approved and recommended sealant.

F. Glazing Stops: Provide snap-on glazing stops coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.8 ALUMINUM FINISHES

A. High-Performance Organic Finish 2-coat, thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight, complying with AAMA 2605. Color shall be a selected by the TPM.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows level, plumb, square, true to line, without warp or rack of frames or sash or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the Work.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.

F. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

G. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

H. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

I. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.2 FIELD QUALITY

A. Testing Agency: Owner may, at his option engage a qualified testing agency to perform tests and inspections and prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: If field tests are to be performed, testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, Test Method A, by applying same test pressures required to determine compliance with AAMA/WDMA 101/I.S.2/NAFS in Part 1 "Performance Requirements" Article.
2. Testing Extent: Three windows as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested immediately after installation.
3. Test Reports: Shall be prepared according to AAMA 502.

C. Remove and replace non-complying aluminum window and retest as specified above.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to aluminum window manufacturer, that ensure window units are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 085200

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 06 Section “Rough Carpentry”.
2. Division 06 Section “Finish Carpentry”.
3. Division 08 Section “Operations and Maintenance”.
4. Division 08 Section “Door Schedule”.
5. Division 08 Section “Door Hardware Schedule”.
6. Division 08 Section “Hollow Metal Doors and Frames”.
7. Division 08 Section “Flush Wood Doors”.
8. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
4. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
5. ICC/IBC - International Building Code.
6. NFPA 70 - National Electrical Code.
7. NFPA 80 - Fire Doors and Windows.

8. NFPA 101 - Life Safety Code.
9. NFPA 105 - Installation of Smoke Door Assemblies.
10. TAS-201-94 - Impact Test Procedures.
11. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
12. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
13. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Qualification: Provide copy of manufacturer(s) Factory Trained Installer documentation indicating proof of status as a qualified installer of tornado or hurricane storm shelter assemblies.

E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

F. Informational Submittals:

1. Hurricane Resistant Openings (State of Florida): Within the State of Florida, provide copy of current State of Florida Product Approval as proof of compliance that doors, frames and hardware for exterior opening assemblies have been tested and approved for use at the wind load and design pressure and debris impact resistance level requirements specified for the Project.

a. Hurricane Resistant Components (State of Florida): Within the State of Florida, provide copy of independent, third party certified listing to ANSI A250.13.

2. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Hurricane Resistant Exterior Openings (State of Florida including the High Velocity Hurricane Zone (HVHZ)): Provide exterior door hardware as complete and tested assemblies, or component assemblies, including approved doors and frames specified under Section 081113 "Hollow Metal Doors and Frames", to meet the design pressures, debris impact resistance, and glass and glazing requirements as detailed in the current State of Florida building code sections applicable to the Project.

1. Each unit to bear third party permanent label in accordance with the Florida Building Code requirements.

G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

C. Do not install hardware prematurely or allowed to be weathered”

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

    a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

    a. Hager Companies (HA) - BB Series, 5-knuckle.
    b. McKinney (MK) - TA/T4A Series, 5-knuckle.
    c. dormakaba BEST (ST) - F/FBB Series, 5-knuckle.

2.2 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Where specified, provide modular continuous geared hinges that ship in two or three pieces and form a single continuous hinge upon installation.
2. Manufacturers:.

    a. Hager Companies (HA).
    b. Pemko (PE).
    c. dormakaba BEST (ST).

2.3 POWER TRANSFER DEVICES

A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets with a 1-year warranty. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

a. Hager Companies (HA) - ETW-QC (# wires) Option.
b. McKinney (MK) - QC (# wires) Option.
c. dormakaba BEST (ST) - C Option.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

a. Burns Manufacturing (BU).
b. Rockwood (RO).
c. Trimco (TC).

B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:

a. Burns Manufacturing (BU).
b. Rockwood (RO).
c. Trimco (TC).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:

a. Burns Manufacturing (BU).
b. Rockwood (RO).
c. Trimco (TC).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

1. Manufacturers:

a. Match Existing BEST key system, Field Verify.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.7 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:

a. Heavy duty 12-gauge wrought steel case.
b. Stainless steel 3/4" one-piece anti-friction reversible latchbolt with a one-piece hardened stainless steel 1” projection deadbolt.
c. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
d. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
e. Meets Florida Building Code FL2998 and UL Certification Directory ZHEM.R21744 for latching hardware for hurricane requirements.
f. Meets UL Certification Directory ZHLL.R21744 for products used in windstorm rated assemblies.
g. Status indicators inside, outside, or on both sides of doors as specified; available with wording for “locked/unlocked”, “vacant/occupied” or custom wording options. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status.
h. Ten-year limited warranty for mechanical functions.

2. Electromechanical locksets shall have the following functions and features:

a. Universal Molex plug-in connectors that have standardized color-coded wiring and are available in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.

c. Options to be available for request-to-exit or enter signaling, latchbolt and deadbolt monitoring.
d. Optional high security monitoring with internal end-of-line monitoring alongside deadbolt privacy and integrated door position monitoring.
e. Two-year limited warranty on electrified functions.

3. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 8800FL Series.
b. Corbin Russwin Hardware (RU) - ML2000 Series.
c. dormakaba BEST (BE) - 45H Series.

2.8 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:

a. Meets ANSI/BHMA A156.41 for single motion egress.
b. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
c. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
d. Meets Florida Building Code FL2998 and UL Certification Directory ZHEM.R21744 for latching hardware for hurricane requirements.
e. Exceeds ANSI/BHMA A156.2 requirements by 2.6 times for 3,100 in-lb. abusive locked lever torque with no entry while maintaining egress.
f. Exceeds ANSI/BHMA A156.2 requirements by 8 times for 1,600 lbs. offset lever pull with no entry for protection against attacks.
g. Exceeds ANSI/BHMA A156.3 requirements by 2 times for latch retraction with 100 lb. preload while maintaining operation in warped doors.
h. Exceeds ANSI/BHMA A156.3 requirements by 20 times for no access with minimum 100 vertical impacts for protection against vandalism attempts.
i. Independent return springs allow lock to exceed ANSI/BHMA A156.2 Grade 1 cycle requirements without lever sag.
j. Ten-year limited warranty for mechanical functions.

2. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 5400LN Series.
b. Corbin Russwin Hardware (RU) - CLX3300 Series.
c. dormakaba BEST (BE) - 9K Series.

2.9 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide exit devices with functions and features as follows:

   a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
   b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
   c. Meets Florida Building Code FL2998 and UL Certification Directory ZHEM.R21744 for latching hardware for hurricane requirements.
   d. Five-year limited warranty for mechanical features.

2. Electromechanical exit devices shall have the following functions and features:

   a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
   b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
   c. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
   d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
   e. Five-year limited warranty for electromechanical features.

3. Manufacturers:

   a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 7000 Series.
   b. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
   c. Von Duprin (VD) - 35A/98 XP Series.

2.11 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 3500 Series.
b. Corbin Russwin Hardware (RU) - DC6000 Series.
c. Norton Rixson (NO) - 8500 Series.
d. Sargent Manufacturing (SA) - 1431 Series.

2.12 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Manufacturers:

a. Norton Rixson (RF) - 980/990 Series.
b. Sargent Manufacturing (SA) - 1560 Series.

2.13 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and

not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

    a. Burns Manufacturing (BU).
    b. Rockwood (RO).
    c. Trimco (TC).

2.14 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Burns Manufacturing (BU).
    b. Rockwood (RO).
    c. Trimco (TC).

2.15 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Hurricane and Storm Shelter Compliance: Devices to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or storm shelter products that have been independently third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

G. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Zero (ZE).

2.16 ELECTRONIC ACCESSORIES

A. Key Switches: Key switches furnished standard with stainless steel single gang face plate with a 12/24VDC bi-color LED indicator. Integral backing bracket permits integration with any 1 1/4" or 1 1/2" mortise type cylinder. Key switches available as momentary or maintained action and in narrow face plate options.

1. Manufacturers:

a. Alarm Controls (AK) - MCK Series.
b. Security Door Controls (SD) - 800 Series.
c. Securitron (SU) - MK Series.

B. Push-Button Switches: Industrial grade momentary or alternate contact, back-lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi-color illumination suitable for either flush or surface mounting.

1. Manufacturers:

a. Alarm Controls (AK) - TS Series.
b. Security Door Controls (SD) - 400 Series.
c. Securitron (SU) - PB Series.

C. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Sargent Manufacturing (SA) - 3280 Series.
b. Security Door Controls (SD) - DPS Series.
c. Securitron (SU) - DPS Series.

D. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.

1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
2. Manufacturers:

a. Securitron (SU) - AQL Series.

2.17 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.18 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies,

conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. SA - SARGENT
5. AD - Adams Rite
6. YA - ASSA ABLOY ACCENTRA
7. SU - Securitron
8. NO - Norton
9. RF - Rixson
10. OT - Other
11. AK - Alarm Controls

Hardware Sets

Set: 1.0

Doors: 100A
Description: EXT ENTRY PR - ALUM - EAC-CALL

1	Continuous Hinge - Pemkonnect	CFMXXHD1-M		PE	
1	Continuous Hinge	CFMXXHD1 SERXXX		PE	⚡
1	Concealed Vert Rod Exit, Exit Only	7220 EO	630	YA	
1	Concealed Vert Rod Exit, Classroom	7220 B MELR 503F	630	YA	⚡
1	SFIC Housing	As required	626	YA	
1	SFIC Core	Keyed to existing facility standard			
2	Door Pull	BF168	US32D	RO	

2	Surface Closer	CPS8501 X Mtg brkts	689	NO	
2	Door Stop	480	US26D	RO	
1	Gasketing	by door / frame mfg			
1	Threshold	2005AT MSES25SS		PE	
1	Call button / Buzzer	By Salto		OT	
1	ElectroLynx Harness	QC-C1500 [PS to hinge / Strike]		MK	⚡
1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK	⚡
1	Prox Reader	By Salto		OT	
1	Door Release	TS-18		AK	⚡
2	Door Position Switch	DPS-XXXX - WH (as required)		SU	⚡
1	Power Supply	AQLXX - R8E1 size as required		SU	⚡

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Door normally closed and secured.
Authorized credential retracts the latchbolt to allow free entry, door relocks upon closing. REX (request to exit) switch in device rail allow for free exit at all times
Call box to office to allow for remote release TS-18
Entry by key override at all times
Door is fail secure

Set: 2.0

Doors: 122A, 122B, 151A, 191B

Description: EXT ENTRY PR - ALUM - EAC

1	Continuous Hinge - Pemkonnect	CFMXXHD1-M		PE	
1	Continuous Hinge	CFMXXHD1 SERXXX		PE	⚡
1	Concealed Vert Rod Exit, Exit Only	7220 EO	630	YA	
1	Concealed Vert Rod Exit, Classroom	7220 B MELR 503F	630	YA	⚡
1	SFIC Housing	As required	626	YA	
1	SFIC Core	Keyed to existing facility standard			
2	Door Pull	BF168	US32D	RO	
2	Surface Closer	CPS8501 X Mtg brkts	689	NO	
2	Door Stop	480	US26D	RO	
1	Gasketing	by door / frame mfg			
1	Threshold	2005AT MSES25SS		PE	
1	ElectroLynx Harness	QC-C1500 [PS to hinge / Strike]		MK	⚡

1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1	Prox Reader	By Salto		OT
2	Door Position Switch	DPS-XXXX - WH (as required)		SU
1	Power Supply	AQLXX - R8E1 size as required		SU

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Door normally closed and secured.
Authorized credential retracts the latchbolt to allow free entry, door relocks upon closing. REX (request to exit) switch in device rail allow for free exit at all times
Entry by key override at all times
Door is fail secure

Set: 3.0

Doors: 101, 121A, 121D, 151B
Description: EXT ENTRY PR - ALUM - EAC

1	Continuous Hinge - Pemkonnect	CFMXXHD1-M		PE
1	Continuous Hinge	CFMXXHD1 SERXXX		PE
1	Concealed Vert Rod Exit, Exit Only	7220 EO	630	YA
1	Concealed Vert Rod Exit, Classroom	7220 B MELR 503F	630	YA
1	SFIC Housing	As required	626	YA
1	SFIC Core	Keyed to existing facility standard		
2	Door Pull	BF168	US32D	RO
2	Surface Closer	CPS8501 X Mtg brkts	689	NO
2	Door Stop	480	US26D	RO
1	Gasketing	by door / frame mfg		
1	Threshold	2005AT MSES25SS		PE
1	ElectroLynx Harness	QC-C1500 [PS to hinge / Strike]		MK
1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
2	Door Position Switch	DPS-XXXX - WH (as required)		SU
1	Power Supply	AQLXX - R8E1 size as required		SU

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.
Door normally closed and secured.
Door to be unlocked on time zone controlled by software
Door is fail secure

Verify panic device function ith owner

Set: 4.0

Doors: 101B, 151C
Description: EXT CORR - ALUM - eac

1	Continuous Hinge	CFMXXHD1 SERXXX		PE
1	Rim Exit Device, Nightlatch	7200 B MELR 121NL	630	YA
1	SFIC Housing	As required	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Door Pull	BF168	US32D	RO
1	Surface Closer	CPS8501 X Mtg brkts	689	NO
1	Door Stop	480	US26D	RO
1	Gasketing	by door / frame mfg		
1	Threshold	2005AT MSES25SS		PE
1	ElectroLynx Harness	QC-C1500 [PS to hinge / Strike]		MK
1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1	Prox Reader	By Salto		OT
1	Door Position Switch	DPS-XXXX - WH (as required)		SU
1	Power Supply	AQLXX - R8E1 size as required		SU

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Door normally closed and secured.
Authorized credential retracts the latchbolt to allow free entry, door relocks upon closing. REX (request to exit) switch in device rail allow for free exit at all times
Entry by key override at all times
Door is fail secure

Set: 5.0

Doors: L105
Description: EXT LOUNGE - EAC

2	Hinge, Full Mortise	TA2314 x NRP 4-1/2" x 4-1/2"	US32D	MK
1	Hinge, Full Mortise	TA2314 QCXX 4-1/2" x 4-1/2"	US32D	MK
1	Fail Secure Lock	MOR 8897FL Temp Core ITS	626	YA
1	SFIC Core	Keyed to existing facility standard		

1	Surface Closer	CPS8501 X Mtg brkts	689	NO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Door Stop	480	US26D	RO
1	Gasketing	S88BL X LAR		PE
1	Rain Guard	346C x LAR		PE
1	Sweep	3452AV		PE
1	Threshold	2005AT MSES25SS		PE
1	ElectroLynx Harness	QC-C1500 [PS to hinge / Strike]		MK
1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1	Prox Reader	By Salto		OT
1	Door Position Switch	DPS-XXXX - WH (as required)		SU
1	Power Supply	AQLXX - R8E1 size as required		SU

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Presenting a valid credential releases the lever to allow free entry, door relocks upon closing. REX (request to exit) switch in the lock allow for free exit at all times
Door to unlock on time zone controlled by software
Entry by key override at all times
Door is fail secure

Set: 6.0

Doors: 120, 190, M1, M2, M3, M4, M5, M6, M7, M8

Description: EXT MECH / STOR PR

6	Hinge, Full Mortise	TA2314 x NRP 4-1/2" x 4-1/2"	US32D	MK
2	Surface Bolt	988 / 580-8	Bright Zinc	SA
1	Storeroom Lock	MOR 8840FL Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
2	Surface Closer	CLP8501	689	NO
2	Armor Plate	K1050 36" X 2" LDW	US32D	RO
1	Astragal	357SP X S88BL		PE
1	Gasketing	S88BL X LAR		PE
1	Rain Guard	346C x LAR		PE
2	Sweep	3452AV		PE
1	Threshold (Heavy Duty)	2715AK MSES25SS		PE

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 7.0

Doors: L101, L102
Description: EXT RESTROOM

3	Hinge, Full Mortise, Hvy Wt	T4A3386 X NRP 4-1/2" x 4-1/2"	US32D	MK
1	Dormitory Lock	MOR 8822FL Temp Core IND	626	YA
1	SFIC Housing	As required	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	8501 Reg / PA	689	NO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Door Stop	480	US26D	RO
1	Gasketing	S88BL X LAR		PE
1	Sweep	315CN		PE
1	Threshold	2005AT MSES25SS		PE

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - provide 3rd party test results for confirmation.

Set: 8.0

Doors: L106
Description: EXT - MEP - EAC

2	Hinge, Full Mortise	TA2314 x NRP 4-1/2" x 4-1/2"	US32D	MK
1	Hinge, Full Mortise	TA2314 QCXX 4-1/2" x 4-1/2"	US32D	MK
1	Dormitory Lock	MOR 8822FL Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	CLP8501	689	NO
1	Armor Plate	K1050 36" X 2" LDW	US32D	RO
1	Gasketing	S88BL X LAR		PE
1	Rain Guard	346C x LAR		PE
1	Sweep	3452AV		PE
1	Threshold (Heavy Duty)	2715AK MSES25SS		PE

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Presenting a valid credential releases the lever to allow free entry, door relocks upon closing. REX (request to exit) switch in the lock allow for free exit at all times
Entry by key override at all times
Door is fail secure

Set: 9.0

Doors: 118
Description: EXT - MEP

3	Hinge, Full Mortise	TA2314 x NRP 4-1/2" x 4-1/2"	US32D	MK
1	Dormitory Lock	MOR 8822FL Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	CLP8501	689	NO
1	Armor Plate	K1050 36" X 2" LDW	US32D	RO
1	Gasketing	S88BL X LAR		PE
1	Rain Guard	346C x LAR		PE
1	Sweep	3452AV		PE
1	Threshold (Heavy Duty)	2715AK MSES25SS		PE

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 10.0

Doors: 117A
Description: EXT - OFFICE - EAC / VIDEO

3	Hinge, Full Mortise	TA2314 x NRP 4-1/2" x 4-1/2"	US32D	MK
1	Fail Secure Lock	MOR 8897FL Temp Core ITS	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	CLP8501	689	NO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Gasketing	S88BL X LAR		PE
1	Rain Guard	346C x LAR		PE
1	Sweep	3452AV		PE
1	Threshold	2005AT MSES25SS		PE
1	Call button / Buzzer	By Salto		OT
1	ElectroLynx Harness	QC-C1500 [PS to hinge / Strike]		MK

1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1	Prox Reader	By Salto		OT
1	Power Supply	AQLXX - R8E1 size as required		SU

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.
Door is normally closed and locked
Presenting a valid credential releases the lever to allow free entry, door relocks upon closing. REX (request to exit) switch in the lock allow for free exit at all times
Entry by key override at all times
Door is fail secure

Set: 11.0

Doors: 125A, 125B, 200, 262
Description: CORR PR - RATED [EMHO]

6	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
2	Fire Rated Surf Vert Rod, Classroom	7170F LBR MO626F	630	YA
2	SFIC Core	Keyed to existing facility standard		
2	Surface Closer	8501 Reg / PA	689	NO
2	Kick Plate	K1050 10" X 2" LDW	US32D	RO
2	Electromagnetic Holder	980 / 990 series	689	RF
1	Astragal set	18061CNB		PE
1	Gasketing	S88BL X LAR		PE

Notes: Wall magnets tied into building fire alarm system to release in case of event

Set: 12.0

Doors: 125C, 191A, 191C
Description: STAIR PR - RATED

6	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Mullion	12-L980	PC	SA
2	Fire Rated Rim Exit, Passage	7100F MO628F	630	YA
1	SFIC Housing	As required	626	YA
1	SFIC Core	Keyed to existing facility standard		
2	Surface Closer	CLP8501	689	NO
2	Kick Plate	K1050 10" X 2" LDW	US32D	RO

1	Astragal	S772BL [mtg on mull]		PE
1	Gasketing	S88BL X LAR		PE

Set: 13.0

Doors: 186, 202A, 260, 261
Description: MEP PR [OHS]

6	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt [Combo-Self-Latching]	2845 / 2945 (as required)	US26D	RO
1	Storeroom Lock	MO 5405LN Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Coordinator (W/mtg plates)	2672 x Mtg Brkts	Black	RO
2	Surface Closer	8501 Reg / PA	689	NO
2	Kick Plate	K1050 10" X 2" LDW	US32D	RO
2	Door Stop	409 / 446 as required	US26D	RO
1	Astragal	357SP X S88BL		PE
1	Gasketing	S88BL X LAR		PE

Set: 14.0

Doors: 116, 148, 226
Description: COMM - RATED

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	MO 5405LN Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	8501 Reg / PA	689	NO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Door Stop	409 / 446 as required	US26D	RO
1	Gasketing	S88BL X LAR		PE

Set: 15.0

Doors: 130A, 152D, M10, M11, M14, M15, M16, M17
Description: CORR MECH - RATED

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	MO 5405LN Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	CLP8501	689	NO

1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Gasketing	S88BL X LAR		PE

Set: 16.0

Doors: 130, 152
Description: PR PANIC [EMHO]

6	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Surface Vert Rod Exit, Dummy	7170 LBR MO629F	630	YA
1	Surface Vert Rod Exit, Classroom	7170 LBR MO626F	630	YA
1	SFIC Housing	As required	626	YA
1	SFIC Core	Keyed to existing facility standard		
2	Surface Closer	8501 Reg / PA	689	NO
2	Kick Plate	K1050 10" X 2" LDW	US32D	RO
2	Door Stop	409 / 446 as required	US26D	RO
2	Electromagnetic Holder	980 / 990 series	689	RF
2	Silencer	608		RO

Set: 17.0

Doors: 121B, 121C
Description: MULTI PURPOSE [OHS]

6	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Surface Vert Rod Exit, Dummy	7170 LBR MO629F	630	YA
1	Surface Vert Rod Exit, Classroom	7170 LBR MO626F	630	YA
1	SFIC Housing	As required	626	YA
1	SFIC Core	Keyed to existing facility standard		
2	Surface Closer	CLP8501	689	NO
2	Kick Plate	K1050 10" X 2" LDW	US32D	RO
2	Electromagnetic Holder	980 / 990 series	689	RF
1	Astragal set	18061CNB		PE
1	Gasketing	S88BL X LAR		PE

Set: 18.0

Doors: 115, 126, 150, 202B, 219
Description: MEP - RATED

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	MO 5405LN Temp Core	626	YA

1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	8501 Reg / PA	689	NO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Door Stop	409 / 446 as required	US26D	RO
3	Silencer	608		RO

Set: 19.0

Doors: 100B

Description: LOBBY - ALUM [UL752-L3] - EAC

1	Continuous Hinge	CFMXXHD1 SERXXX		PE
1	Fire Rated Rim Exit, Passage	7100F B MELR MO628F	630	YA
1	SFIC Housing	As required	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	CLP8501	689	NO
1	Gasketing	by door / frame mfg		
1	ElectroLynx Harness	QC-C1500 [PS to hinge / Strike]		MK
1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1	Prox Reader	By Salto		OT
1	Door Release	TS-18		AK
1	Door Position Switch	DPS-XXXX - WH (as required)		SU
1	Power Supply	AQLXX - R8E1 size as required		SU

Notes: Presenting a valid credential releases the lever to allow free entry, door relocks upon closing. REX (request to exit) switch in the lock allow for free exit at all times
Remote release by TS-18
Entry by key override at all times
Door is fail secure
Hardware listed for for bullet resistant doors, verify with specific door mfg what are their hardware requirements to meet bullet resistant rating prior to ordering any material.

Set: 20.0

Doors: 109

Description: CLINIC

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	MO 5408LN Temp Core	626	YA

1	SFIC Core	Keyed to existing facility standard		
1	Surface Closer	8501 Reg / PA	689	NO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Door Stop	409 / 446 as required	US26D	RO
3	Silencer	608		RO

Set: 21.0

Doors: 144, 218
Description: PUBLIC - TOILET

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Privacy Lock	MO 5402LN	626	YA
1	Surface Closer	8501 Reg / PA	689	NO
1	Mop Plate	K1050 4" X 1" LDW	US32D	RO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Door Stop	409 / 446 as required	US26D	RO
1	Gasketing	S88BL X LAR		PE

Set: 22.0

Doors: 129A, 129B, 136A, 136B, 155A, 155B, 160A, 160B, 172A, 172B, 177A, 177B, 206A, 206B, 211A, 211B, 231A, 231B, 238A, 238B, 244A, 244B, 250A, 250B
Description: CLASS VEST

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Passage Latch	MO 5401LN	626	YA
1	Pull Plate	BF 110 x 70C	US32D	RO
1	Push Plate	70C	US32D	RO
1	Surface Closer	CLP8501	689	NO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
3	Silencer	608		RO

Set: 23.0

Doors: 119, L107
Description: MEP PR

6	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
2	Flush Bolt	555 [12" / 72" AFF]	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	MO 5405LN Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		

2	Door Stop	409 / 446 as required	US26D	RO
2	Silencer	608		RO

Set: 24.0

Doors: 101A, 101D, 106, 108A, 109A, 130B, 152A, 152B, 152C, 227, M13
Description: STOR

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	MO 5405LN Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Door Stop	409 / 446 as required	US26D	RO
1	Gasketing	S88BL X LAR		PE

Set: 25.0

Doors: 114, 145, 224
Description: JAN

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	MO 5405LN Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Mop Plate	K1050 4" X 1" LDW	US32D	RO
1	Door Stop	409 / 446 as required	US26D	RO
1	Gasketing	S88BL X LAR		PE

Set: 26.0

Doors: 128A, 128B, 137A, 137B, 142, 147, 154A, 154B, 159A, 159B, 171A, 171B, 176A, 176B, 205A, 205B, 212A, 212B, 216, 222, 230A, 230B, 239A, 239B, 243A, 243B, 251A, 251B, 258, M12
Description: TEACHER OFFICE

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	MO 5405LN Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Door Stop	409 / 446 as required	US26D	RO
1	Gasketing	S88BL X LAR		PE
3	Silencer	608		RO

Set: 27.0

Doors: 104, 112B, 113B, 117B, 183
Description: OFFICE

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Entry Lock	MO 5407LN Temp Core	626	YA
1	SFIC Core	Keyed to existing facility standard		
1	Door Stop	409 / 446 as required	US26D	RO
3	Silencer	608		RO

Set: 28.0

Doors: 103, 105, 108, 110, 111, 113A
Description: OFFICE - ALUM

1	Continuous Hinge - Pemkonnect	CFMXXHD1-M		PE
1	Mortise Deadlock	MS1850S X 4066	628	AD
1	Cylinder	as required	US32D	SA
1	SFIC Core	Keyed to existing facility standard		
2	Door Pull	BF168	US32D	RO
1	Door Stop	409 / 446 as required	US26D	RO
1	Gasketing	by door / frame mfg		
3	Silencer	608		RO

Set: 29.0

Doors: 127, 133, 138, 139, 140, 141, 153, 158, 168, 169, 170, 175, 180, 181, 182, 187, 201, 203, 204, 213, 214, 215, 221, 228, 228A, 229, 235, 240, 241, 242, 247, 252, 253, 254, 257
Description: CLASS [INTRUDER FUNCTION]

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Intruder Classroom Lock	MO 5418LN Temp Core ***	626	YA
2	SFIC Core	Keyed to existing facility standard		
1	Door Stop	409 / 446 as required	US26D	RO
3	Silencer	608		RO

Set: 30.0

Doors: 101E, 101F, 109B, 111A, L103, L104
Description: TOILET

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Privacy Lock	MO 5402LN	626	YA
1	Mop Plate	K1050 4" X 1" LDW	US32D	RO
1	Door Stop	409 / 446 as required	US26D	RO
1	Gasketing	S88BL X LAR		PE

Set: 31.0

Doors: 131, 132, 134, 135, 140A, 143, 156, 157, 161, 162, 173, 174, 178, 179, 184, 207, 208, 209, 210, 217, 223, 232, 234, 236, 237, 245, 246, 248, 249, 259

Description: CLASS TOILET

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Passage Latch	MO 5401LN	626	YA
1	Mop Plate	K1050 4" X 1" LDW	US32D	RO
1	Kick Plate	K1050 10" X 2" LDW	US32D	RO
1	Door Stop	409 / 446 as required	US26D	RO
1	Gasketing	S88BL X LAR		PE

Set: 32.0

Doors: 102, 112A

Description: CONF

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Passage Latch	MO 5401LN	626	YA
1	Door Stop	409 / 446 as required	US26D	RO
3	Silencer	608		RO

Set: 33.0

Doors: L108

Description: OH DOOR

1	HBO	All hardware By door mfg

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Glass for windows, exterior doors, storefront framing, skylights.
2. Glazing sealants and accessories.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

C. Bird Friendly Film:

1. Deliver and store materials in original container with manufacturers label and seals intact.
2. Store flat at room temperature. Avoid humidity in clean dry area.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

1.8 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

1. Obtain tinted glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

1. Design Wind Pressures: 167 mph.
2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings. See Structural Drawings.

    a. Wind Design Data: As indicated on Drawings.
    b. Basic Wind Speed: 167 mph.
    c. Importance Factor: 2.0.
    d. Exposure Category: C.
3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with basic protection testing requirements in ASTM E 1996 for Wind Zone 2 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.

E. Safety Glazing: Where safety glazing is required, provide glazing that complies with 16 CFR 1201, Category II.

F. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For laminated-glass lites, properties are based on products of construction indicated.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

C. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.4 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

B. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminate glass with one of the following to comply with interlayer manufacturer's written instructions:

1. Polyvinyl butyral interlayer.
2. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
3. Ionomeric polymer interlayer.

4. Cast-in-place and cured-transparent-resin interlayer.
5. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Manufacturer's standard spacer material and construction.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealant shall have a VOC content of 250 g/L or less.
4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
5. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Bird Friendly Film: Basis of Design – Feather Friendly Technologies, Inc. materials: Markers shall be manufactured from premium grade film with permanent exterior grade adhesive. Provide symmetry pot pattern visible markers ¼" diameter space 2"x2" grip pattern.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

C. Bird Friendly Film: Clean glass surfaces of substances that could impair glazing film bond including mildew, oil, grease, dirt and other foreign materials immediately before installation of markers.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 CLEANING AND PROTECTION

A Immediately after installation remove nonpermanent labels and clean surfaces.

B Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 092600 - GYPSUM BOARD ASSEMBLIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum wallboard
2. Non-load bearing steel framing

1.3 DEFINITIONS

A. Gypsum Board Terminology: Refer to ASTM C11-08c "Standard Terminology Relating to Gypsum and Related Building Materials and Systems" for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119-08a by and independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory" and GA-600, "Fire Resistance Design Manual."

B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to hose tested in assembly indicated according to ASTM E 90-04 and classified according to ASTM E 413-04 by a qualified independent testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer of supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840-08 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by on of the following:

1. Steel Framing and Furring
2. Clark Western Building Systems, Inc.
3. Dietrich Metal Framing; Division of Worthington Industries, Inc.
4. Marino\Ware; Division of Ware Industries, Inc.
5. National Gypsum Company.
6. The Steel Network, Inc.
7. Scafco Steel Stud Manufacturing Company; Scafco Corporation.

B. Gypsum Board and Related Products:
1. Georgia-Pacific Gypsum LLC; Subsidiary of Georgia-Pacific Corporation.
2. National Gypsum Company.
3. United States Gypsum / USG Corporation.

2.2 STEEL SUSPENDED CEILING FRAMING

A. Components, General: Comply with ASTM C 754-07 for conditions indicated.

B. Tie Wire: ASTM A 641/A 641M-03, Class 1 zinc coating, soft temper, 0.0625 inch (1.59 mm) diameter wire, or double strand of 0.0475 inch (1.21 mm) diameter wire.

C. Hangers: As follows:

1. Wire Hangers: ASTM A 641/A 641M-03, Class 1 zinc coating, soft temper, 0.162 inch (4.12 mm) diameter.

D. Supplementary Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm), a minimum ½ inch (12.7 mm) wide flange, with ASTM A 653/A 653M-08, G60 (Z180), hot-dip galvanized zinc coating.

E. Grid: Suspension System for Interior Ceilings: ASTM C 645-08a, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, provide one of the following.

a. Armstrong World Industries, Inc.; Furring Systems/Drywall

b. Chicago Metallic Corporation, Drywall Furring 660 System

c. USG Interiors, inc.; Drywall Suspension System

2.3 STEEL SOFFIT FRAMING

A. Components, General: As follows:

1. Comply with ASTM C 754-07 for conditions indicated.

2. Steel Sheet Components: Complying with ASTM C 645-08a requirements for metal and with manufacturer's standard corrosion-resistant zinc coating.

B. Steel Studs and Runners: ASTM C 645-08a.

1. Minimum Base Metal Thickness: 18 ga. For all steel studs and runners.
   a. Framing for soffits shall be 3 5/8"-18 ga. galvanized steel stud framing. Deflection track is not required.
   b. Metal framing for the soffits shall be screwed, using 4-#10 TEK screws at each joint, typical.

2. Depth: As indicated.

2.4 INTERIOR GYPSUM WALLBOARD

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Abuse-Resistant Gypsum Wall board: ASTM C1629/ C1629M-06 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels , manufactured to produce greater resistance to surface indentation and through penetration than standard gypsum panels.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. National Gypsum Company; Gold Bond Hi-Abuse Wall board.

   b. United States Gypsum Co.; SHEETROCK brand Abuse-Resistant Gypsum panels.

2. Core: 5/8"; Type X.

3. Long Edges: tapered.

4. Location: As Indicated.

C. Gypsum Wallboard: ASTM C1629/ C1629M-06 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. National Gypsum Company.

   b. United States Gypsum Co.

2. Core:

a. 5/8 inch, Type X, where indicated for fire-rated and non-fire rated construction.

b. 1/2 inch, where indicated for draft-stop partitions.

3. Long Edges: Tapered

4. Location: As indicated

C. Water-Resistant Gypsum Board: ASTM C1629/ C1629M-06 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels, manufactured for water-resistant applications, such as walls and ceilings in toilet rooms, and as indicated on the drawings.

1. Core: 5/8-inch (15.9mm), Water resistant, Provide Type "X" where indicated for fire-resistant rated construction.

2. Edges: Tapered

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047-05.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

2. Shapes:

a. Cornerbead: Use at outside corners, unless otherwise indicated.

b. L-Bead: Use at exposed panel edges.

c. Expansion (Control) Joints: Use where indicated.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475-01/ C 475M-02(2007).

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

2. Fill Coat: For second coat, use setting-type, sandable topping compound.

3. Finish Coat: For third coat, use setting-type, sandable topping compound.

2.7 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.

b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002-07, unless otherwise indicated.
1. Use screws complying with ASTM C 954-07 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Thermal Insulation: Material indicated below.
1. Foil-faced Mineral-Fiber Batt Insulation: Foil-Faced fiber-fiber batt insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665-06.
a. Mineral-Fiber Type: fibers manufactured from glass.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754-07, and ASTM C 840-08 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.

2. Isolate partition framing where it abuts structure except at floor. Install slip-type joints at

head of assemblies that avoid axial loading of assembly and laterally support assembly.

3.3 INSTALLING STEEL SUSPENDED CEILING FRAMING

A. Suspend ceiling hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Spray hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter spraying or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Do not attach hangers to steel roof deck. Attach hangers to structural members.
5. Do not connect to or suspend steel framing from ducts, pipes, nor conduit.

B. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.4 APPLYING AND FINISHING PANELS, GENERAL

A. Gypsum Board Application and Finishing Standards: ASTM C 840-08 and GA-216.

B. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install gypsum panels with face side out. Butt panels together for alight contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling application where intermediate supports or gypsum board back blocking is provide behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite side of partitions. Do not make joints other than control joints at corners of framed openings.

E. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

F. Attach gypsum panels to framing provided at openings and cutouts.

G. Form control and expansion joints with space between edges of adjoining gypsum panels.

H. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

1. Space screws a maximum of 12 inches (304.8 mm) o.c. in field of board on 8" o.c. at perimeter of board for vertical applications.

I. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

3.5 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.

B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Double-Layer Application: On ceilings indicated to be fire-rated, apply two layers of 5/8 inch Type 'X' gypsum Board. Stagger joints between layers.

3.6 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840-08.

3.7 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, edge trim, control joints penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840-08, for locations indicated:

1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 4: Embed tape and apply separate first, fill and finish coats of joint compound to tape, fasteners and trim flanges at panel surfaces that will be exposed to view.

END OF SECTION 092600

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Porcelain tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.3: For tile floors, documentation from an independent testing agency indicating compliance with the FloorScore Standard.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

1.3 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile from one source or producer.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Stone thresholds.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. Provide wall tile Atlas Concorde, Pattern: Cove Terra, Color: White, Size: 12” X 24”.

C. Provide wall tile Corssville, Pattern: Retro Active 2.0, Color: Gulf Breeze, Size: 6” X 12”.

D. Provide floor tile Atlas Concorde, Pattern: Cove Terra, Color: Pearl, Size: 12” X 24”.

2.2 TILE PRODUCTS

A. Tile Type porcelain tile.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

a. Atlas Concorde, USA.
b. Crossville, Inc.
c. Daltile; Division of Dal-Tile International Inc.

3. Composition: Porcelain.
4. Module Size: As indicated.

5. Thickness: 1/4 inch (6.35 mm).
6. Face: Pattern of design indicated, with cushion edges.
7. Tile Color and Pattern: Match Architect's sample.
8. Grout Color: As selected by Architect from manufacturer's full range.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base Cove

2.3 SETTING MATERIALS

A. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Bonsal American; an Oldcastle company.
    b. Custom Building Products.
    c. MAPEI Corporation.

2.4 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Standard Cement Grout: ANSI A118.6.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Bonsal American; an Oldcastle company.
    b. Custom Building Products.
    c. MAPEI Corporation.

2.5 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; exposed-edge material.

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bonsal American; an Oldcastle company; Grout Sealer.
b. Custom Building Products; Grout and Tile Sealer.
c. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.

2.6 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used. Comply with TCA’s installation method F113-05.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. Where adjoining tiles on floor, base, or trim are specified or indicated to be same size, align joints.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Floor Tile: 1/4 inch (6.35 mm).

G. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

H. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

3.5 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F144-17: Porcelain tile over thin-set mortar on fiber cement backer board.

a. Tile Type: To be selected.

END OF SECTION 093000

SECTION 093010 - MARBLE WINDOW STOOLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Marble window stools.

B. Related Sections: The following sections contain requirements that relate to this Section:
   1. Division 4 Section "Unit Masonry."
   2. Division 8 Section "Aluminum Windows."

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified.

C. Samples for initial selection purposes in form of 12-inch by 12-inch samples of the actual marble to be installed. Minimum of two (2) samples.

D. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Marble: Obtain each color, grade, finish, type, composition, and variety of marble from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Installer Qualifications: Engage an experienced Installer who has successfully completed marble installations similar in material, design, and extent to that indicated for Project.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings".

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

C. Handle marble with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If despite these precautions coating does contact bonding surfaces of marble, remove coating from bonding surfaces before setting marble.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to marble workers from carbon dioxide buildup.

C. Maintain temperatures at 50 deg F (10 deg C) or more in areas receiving marble during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.7 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for marble window stool installation.

B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

2.2 MARBLE WINDOW STOOLS

A. Marble window stools shall be 3/4" white natural marble as detailed on drawings. Stools shall project approximately 1/2" from vertical walls.

2.3 SETTING MATERIALS

A. Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A108.1 and as specified below.

1. Latex additive (water emulsion) described below, serving as replacement for part or all of gauging water, of type specifically recommended by latex additive manufacturer for use with job-mixed portland cement and aggregate mortar bed.
   a. Latex Additive: Manufacturer's standard.

2.4 GROUTING MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color as selected by Sverdrup.

2.5 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas where marble will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed marble.
   1. Verify that substrates for setting marble are firm, dry, clean, and free from oil or waxy films and curing compounds.
   2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind marble has been completed before installing marble.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation

of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.

B. TCA Installation Guidelines: 2008 TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation method WS 910.

3.3 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all marble surfaces so they are free of foreign matter.

B. Finished Marble Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective marble work.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that marble is without damage or deterioration at time of Substantial Completion.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from marble surfaces.

END OF SECTION 09300

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Acoustical tiles for interior ceilings.
2. Fully concealed, direct-hung, suspension systems.
3. Direct attachment of tiles to substrates with adhesive.
4. Direct attachment of tiles to substrates with staples.

B. Related Requirements:

1. Section 095113 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
2. Section 095133 "Acoustical Metal Pan Ceilings" for ceilings consisting of metal-pan units with exposed and concealed suspension systems.

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.

C. Samples for Initial Selection: For components with factory-applied finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
2. Concealed Suspension-System Members: [6-inch- (150-mm-)] <Insert dimension> long Sample of each type.
3. Exposed Moldings and Trim: Set of [6-inch- (150-mm-)] <Insert dimension> long Samples of each type and color.
4. Seismic Clips: Full size.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.

    a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical tile.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:

    a. Lighting fixtures.
    b. Diffusers.
    c. Grilles.
    d. Speakers.
    e. Sprinklers.
    f. Access panels.
    g. Perimeter moldings.

7. Show operation of hinged and sliding components adjacent to acoustical tiles.
8. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical tile ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical tile ceiling suspension system from ICC-ES.

E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.

1.7 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations:

1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
2. Directly Attached Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E 1264.
2. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL TILES ACT-1 Armstrong, Ultima #1941, 24” x 24” x 7/8”

A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

B. Classification: Provide tiles as follows:
1. Type and Form: Type IVM Form 2.
2. Pattern: E (lightly textured).

C. Color: White

D. Light Reflectance (LR): Not less than 87.

E. Ceiling Attenuation Class (CAC): Not less than 35.

F. Noise Reduction Coefficient (NRC): Not less than 80.

G. Articulation Class (AC): Not less than 170.

H. Edge/Joint Detail: Beveled Tegular.

I. Thickness: 7/8”

J. Modular Size: 24 x 24”

K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 ACOUSTICAL TILES ACT-2 Armstrong, Optima 3255

A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

B. Color: White

C. Light Reflectance (LR): Not less than 87.

D. Ceiling Attenuation Class (CAC): Not less than 35.

E. Noise Reduction Coefficient (NRC): Not less than 80.

F. Articulation Class (AC): Not less than 170.

G. Edge/Joint Detail: Square Tegular.

H. Thickness: 7/8”

I. Modular Size: 48 x 48”

J. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.5 METAL SUSPENSION SYSTEM Armstrong prelude 15/16”

A. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, fully concealed, metal suspension system and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C 635/C 635M.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635/C 635M.

B. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation.

1. Structural Classification: Intermediate duty system.
2. Access: Upward Downward and end pivoted or side pivoted, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.

a. Initial Access Opening: In each module, 24 by 24 inches (610 by 610 mm).

2.6 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: 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 five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Cast-in-place anchors.
b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B 633, Class SC 1 (mild) service condition.
c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to [10] <Insert safety factor> times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
3. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch- (3.5-mm-) diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.

H. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Armstrong Manufacturers Standard

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.

1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
2. Finish: Painted white

C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.

1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C 635/C 635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.8 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

2.9 MISCELLANEOUS MATERIALS

A. Acoustical Tile Adhesive: Type recommended in writing by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.

B. Staples: 5/16-inch- (8-mm-) long, divergent-point staples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

C. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. Install suspended acoustical tile ceilings according to ASTM C 636/C 636M[, seismic design requirements,] and manufacturer's written instructions.

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.

10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Arrange directionally patterned acoustical tiles as follows:

1. As indicated on reflected ceiling plans.
2. Install tiles with pattern running in one direction parallel to [long] [short] axis of space.
3. Install tiles in a basket-weave pattern.

G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.

1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches (305 mm) o.c.
3. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 INSTALLATION OF DIRECTLY ATTACHED ACOUSTICAL TILE CEILINGS

A. Adhesive Installation: Install acoustical tile by bonding to substrate, using acoustical tile adhesive and procedure recommended in writing by tile manufacturer and as follows:

1. Wipe and prime ceiling.
2. Remove loose dust from backs of tiles by brushing.

3. Install splines in joints between tiles and maintain bottom surface to a uniform level. Shim tile or correct substrate as required to maintain levelness.
4. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.

B. Stapled Installation: Fasten acoustical tile to substrate using a minimum of two staples per tile that are installed in flanges of tile and as follows:

1. Form double-lapped joint between tiles by securely pressing tile tongues into corresponding tile grooves.
2. Maintain bottom surface of tiles to a uniform level. Shim tile or correct substrate as required to maintain levelness.
3. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.

C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.

3.5 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of[1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of [1/8 inch in 12 feet (3 mm in 3.6 m)] <Insert dimensions>, non-cumulative.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

B. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.

1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

C. Acoustical tile ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 ADJUSTING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

SECTION 095126 LINEAR VENEERED WOOD CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

a) Section Includes:

1. WoodWorks Linear Veneered Open
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, wall angle moldings and accessories.

b) Related Sections:

1. Section 09 53 00 - Acoustical Ceiling Suspension Assembly
2. Section 09 22 16 - Non-Structural Metal Framing

1.3 REFERENCES

a) American Society for Testing and Materials (ASTM):

1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
3. ASTM A 1008 Standard Specification for Steel, Sheet, and Cold Rolled Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E 580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.
8. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
9. ASTM E 1264 Classification for Acoustical Ceiling Products.

10. Hardwood Plywood & Veneer Association (HPVA)

1.4 SUBMITTALS

a) **Shop Drawings:** Layout and details of ceilings. Show locations of items that are to be coordinated with or supported by the ceilings.

b) **Installation Instructions:** Submit manufacturer's installation instructions as referenced in Part three, Installation.

c) **Product Data:** Submit manufacturer's technical data for each type of ceiling unit and suspension system required.

d) **Samples:** Real Wood Veneer on fire rated particle board – Semi-gloss tinted topcoat – Clear Finish

e) **Certifications:** Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

f) **Non-Conformance:** All products not conforming to the requirements of this specification and or the manufacturer's published values are to be disposed. The Contractor performing the work will replace with approved product at their expense.

1.5 QUALITY ASSURANCE

a) Single-Source Responsibility: Provide ceiling panel units and grid components by a single manufacturer.

b) Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E-84 and complying with ASTM E 1264 for Class A products.
2. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E-84 tunnel test.

c) Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.

d) Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

a) Store ceiling components in a dry interior location in their cartons prior to installation to avoid damage. Store cartons in a flat, horizontal position. The protectors between the panels should not be removed until installation.

b) Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86

degrees F. Panels must not be exposed to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.

c) Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.7 PROJECT CONDITIONS

a) Wood ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

b) The wood panels should not be installed in spaces where the temperature or humidity conditions vary from the temperatures and conditions that will be normal in the occupied space.

c) As interior finish products, the veneered panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.8 WARRANTY

a) Veneered Wood Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:

1. Veneered Wood Panels: Defects in materials or factory workmanship.
2. Grid System: Rusting and manufacturing defects.

b) Warranty Period:

1. Veneered Wood panels: One (1) year from date of installation.
2. Grid: Ten years from date of installation.

c) The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 MAINTENANCE

a) Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Ceiling Units: Furnish quality of full-size units equal to 2.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 1.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

a) Basis of Design WoodWorks Linear Veneered Open:

1. Armstrong World Industries, Inc.

b) Suspension Systems:

1. Armstrong World Industries, Inc.

2.2.0 WOOD CEILING UNITS

a) Ceiling Panels Type AP-1:

- Surface Texture: Smooth
- Composition: Real wood veneer on fire rated particle board
- Finish(s): Real Wood Veneer
  - Rift White Oak (NRO)

  Custom finishes available

  Panel Width Size(s): With 3/4" reveal Plank to Plank @ Width
  - 4-inch (O.C.): 3-3/4-inch Plank Width (Actual)

  Panel Length Size(s): With no reveal @ Length
  - 96-inch (Actual)

  <u>WoodWorks Linear Veneered Open Options:</u>

  Height – (Plank Width) – Reveal Width [item#]
  - 3/4" – (3-3/4") – 3/4" [6440F01W1
- Flame Spread:

  Class A: ASTM E84 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less.

  CAN/ULC S102 surface burning characteristics. Flame Spread Rating 25 or less. Smoke Developed Classification 50 or less.
- Acceptable Product: WoodWorks Linear Veneered Open – as manufactured by Armstrong World Industries.

b) Accessories:

1. Backer Clip - Item 5687
2. Tee Bar Hook – Item 5986
3. Wood Screws – Item 7123PKG300

4. Safety Cable – Item 6091
5. Support Hanger – Item SH12
6. Beam End Retaining Clip – Item BERC2
7. WoodWorks Linear Veneered Open Grid Tee Snap-in Clip – Item 5373

2.2.1 SUSPENSION SYSTEMS

c) Components: All main beams and cross tees shall be commercial quality hot dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with 15/16-inch type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

1. Structural Classification: ASTM C635 (Heavy Duty)
2. Color: Tech Black.
3. Acceptable Product: 12’ HD Linear Carriers for 4-1/2” modules 5370, 12’ HD Linear Carriers for 6” modules 5371, Prelude XL 2’ Cross Tee XL7328BL (for discontinuous/cloud applications) as manufactured by Armstrong World Industries, Inc.
4. 12-Gauge Hanger Wire – Item 7891

d) Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

e) Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least times-three design load, but not less than 12 gauge.

f) Accessories/Edge Moldings and Perimeter Trim:

a. Shadow Molding (seismic) - Item7823
b. Angle Molding – Item 7805
c. WoodWorks Linear Veneered Open Grid Tee Snap-In Clip – Item 5373
d. 4” Veneered Trim with 4 Clips – item 6481F07W1H4 NRO, - W/Real Wood Edgebanding

PART 3 - EXECUTION

3.1 EXAMINATION

a) Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.

b) Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

3.2 PREPARATION

a) Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

b) WoodWorks ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

3.3 INSTALLATION

a) Interior WoodWorks products, the veneered wood panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

b) Install suspension system and panels in compliance with ASTM C636, ASTM E580, with the approval of the authorities having jurisdiction, and in accordance with the manufacturer's WoodWorks Linear Veneered Panels Installation Instructions.

3.4 ADJUSTING AND CLEANING

a) Replace damaged and broken panels.

b) Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

END OF SECTION 095126

SECTION 095200 - ACOUSTICAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes Acoustical Wall Panels.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data:
   1. Acoustical Wall Panels: Manufacturer's descriptive data and catalog cuts.
   2. Certificates stating that the acoustical panels conform to the specified requirements.

C. Samples:
   1. Acoustical Wall Panels: Manufacturer's standard fabric swatches, minimum 18 inches wide by 24 inches long 2 samples of each color range specified.

1.4 DELIVERY AND STORAGE

A. Materials delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acoustical Panels: Armstrong World Industries "Soundsoak"; size and application methods as indicated on drawings. Wrap panel edges with fabric.

2.2 ACOUSTICAL WALL PANELS

A. Acoustical wall panels shall consist of pre-finished factory assembled, seamless fabric covered, fiber glass or mineral fiber core system as described below. Perimeter edges shall be reinforced by either an aluminum frame or a formulated resin edge hardener.
   1. Width: Panel width shall be 30-inches.
   2. Height: Panel height shall be as indicated on the Drawings.
   3. Thickness: 3/4-inch nominal.
   4. Fabric Covering: plain woven 2-ply 100 percent polyester, minimum 15 ounces per linear yard. Tear strength shall be minimum 29 pounds in accordance with ASTM D 2261-07a. Tensile strength shall be 150 pounds minimum in accordance with

ASTM D 5034-08. Fabric covering shall be stretched free of wrinkles and then bonded to the edges and back of panel a minimum distance standard with the manufacturer.

a. Light fastness (fadeometer): 40 hours in accordance with AATCC 16.
b. Color: Guilford FR-701, No. 401, Blue Neutral.

5. Fire rating for the complete component system: ASTM E 84-08 Class A, 25 or less.
6. Substrate: Fiber glass or mineral fiber.
7. Noise Reduction Coefficient (NRC) Range: 0.65-0.75 ASTM C 423-08.
8. Edge Detail: Square edge, wrapped with fabric.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Walls shall be clean, smooth, oil free and prepared in accordance with panel manufacturer's instructions.

3.2 INSTALLATION

A. Panel installation shall be by personnel familiar with and normally engaged in installation of acoustical wall panels. Panels shall be applied using concealed "H" splines and continuous "J" strip at panel bottoms in accordance with the manufacturer's installation instructions. Panels shall be field cut to provide approximately 48-inch panels, wrap fabric and secure at cut edge.

3.3 CLEANING

A. Following installation, dirty or stained panel surfaces shall be cleaned in accordance with manufacturer's instructions and left free from defects. Panels that are damaged, discolored, or improperly installed shall be removed and new panels provided as directed.

END OF SECTION 095200

SECTION 095436 - SUSPENDED DECORATIVE GRIDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes rigid, open-frame, suspended grids and suspension systems for ceilings.

B. Products furnished, but not installed, under this Section include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Set of **12-inch- (300-mm-) square** module Samples of each type, finish, and color.

E. Delegated-Design Submittal: For design of attachment devices.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Lighting fixtures.
2. Speakers.
3. Speakers

4. Sprinklers

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver suspended decorative grid components to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Handle suspended decorative grids and accessories carefully to avoid damaging units and finishes in any way.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design attachment devices.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

2.2 SUSPENDED DECORATIVE PANELS, GENERAL

A. Sheet Metal Characteristics: Provide sheet metal selected for surface flatness, smoothness, and freedom from surface blemishes where exposed to view in finished unit. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled metal sheet, stains, discolorations, or other imperfections.

1. Aluminum Sheet: Roll-formed aluminum sheet, complying with ASTM B 209 (ASTM B 209M); alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Grid Fabrication: Components are formed from metal indicated. Manufacturer's standard units of size, shape and profile indicated; finished to comply with requirements indicated.

C. Cover Profiles and Trim: Provide manufacturer's standard cover profiles and trim for exposed members, and as indicated or required, for edges of grids, at changes in ceiling height, and for other conditions, of same metal and finish as suspended decorative grids.

D. Metal Suspension-System Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635/C 635M requirements. Provide systems complete with runners or beams, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, web covers, load-resisting struts, fixture filler pans, clips and adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.

E. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated.

F. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at 3 times hanger design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, is less than yield stress of wire.

G. **Hanger Rods**: Mild steel, zinc coated or protected with rust-inhibitive paint.

H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

I. Exposed Metal Edge Moldings, Covers, Trim, and Fixture Filler Panels: Provide exposed members as required to conceal edges of and penetrations through ceiling, to conceal edges of beams, to cover runner webs, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching suspended decorative grids unless otherwise indicated.

2.3 ALUMINUM GRID UNITS FOR SUSPENDED DECORATIVE GRIDS

A. Manufacturer's: Subject to compliance with requirements.

B. Basis-of-Design Product: Subject to compliance with requirements, provide:
1. Armstrong Serpentina Classic, Pre-Engineered Curved Metal Ceiling System

C. Serpentina Suspension System:
   1. Main Beams and Curved Perimeter System – Item Number 1045
      a. Chord Length: 9'-8"
      b. Chord Depth: 11-3/8"
      c. Radius: 12'-8"

D. Aluminum Panels:
   1. Perforations: Pattern R042 with Acoustical Fleece Backing
   2. Color: Silver Satin

2.4 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

A. Clear Coated Finish: Manufacturer's standard powder-coat baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which suspended decorative grids attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of suspended decorative grids.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of suspended decorative grids to balance border widths at opposite edges of each space. Comply with layout shown on reflected ceiling plans and approved manufacturer shop drawings.

3.3 INSTALLATION

A. General: Install suspended decorative grids to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for structure to which hangers are attached and for hanger type involved.
5. Do not support grids directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. Do not attach hangers to steel deck tabs.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install suspended decorative grids in coordination with suspension system and exposed moldings and trim. Comply with installation tolerances according to CISCA's "Metal Ceilings Technical Guidelines."

1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
2. Fit adjoining units to form flush, tight joints.
3. Where grid edges are visible, install cover profiles unless other trim is indicated.

3.4 CLEANING

A. Clean exposed surfaces of suspended decorative grids, including trim and edge moldings, after removing strippable, temporary protective covering if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace grid components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and deformed grids.

END OF SECTION 095436

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Thermoplastic-rubber base.
   2. Rubber stair accessories.
   3. Rubber molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long.

E. Product Schedule: For resilient base and accessory products.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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

   1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

A. RB-1 TARKETT/JOHNSONITE 4” TRADITIONAL BASE

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style A, Straight: Provide in areas with carpet.
b. Style B, Cove: Provide in areas with resilient floor coverings

C. Thickness: 0.125 inch (3.2 mm).

D. Height: 4 inches (102 mm).

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Preformed.

H. Colors: As indicated on drawings.

2.2 RUBBER STAIR ACCESSORIES ST-1

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. ROPPE

C. Stair Treads: ASTM F 2169.

1. Type: TS (rubber, vulcanized thermoset).
2. Class: 2 (pattern; embossed, grooved, or ribbed).
3. Group: 1 (embedded abrasive strips).
4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
5. Nosing Height: 1-1/2 inches (38 mm).
6. Thickness: 1/4 inch (6 mm) and tapered to back edge.
7. Size: Lengths and depths to fit each stair tread in one piece.

D. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

1. Style: Toeless, by length matching treads.
2. Thickness: Manufacturer's standard.

E. Stringers: Height and length after cutting to fit risers and treads and to cover stair stringers, produced by same manufacturer as treads, and recommended by manufacturer for installation with treads.

1. Thickness: Manufacturer's standard.

F. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

G. Locations: As indicated on drawings.

H. Colors and Patterns: As indicated on drawings.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Metal Edge Strips: Extruded aluminum with mill finish, nominal 2 inches (50.8 mm) wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.
3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.

1. Apply manufacturers suggested coats.

E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid vinyl floor tile.
2. Rubber floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of resilient floor tile.

1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples: Full-size units of each color, texture, and pattern of floor tile required.

D. Samples for Initial Selection: For each type of floor tile indicated.

E. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 SOLID VINYL FLOOR TILE - LVT 1-4

A. Tarkett Color Play

B. Tile Standard: ASTM F 1700

1. Class: Class III, Printed Film Vinyl Tile.
2. Type: B, Embossed Surface.

C. Thickness: 0.120 inch (3.0 mm).

D. Size: 18 x 18 inches (457 by 457 mm).

E. Seamless-Installation Method: Manufacturer suggested installation methods.

Colors and Patterns: As indicated on drawings.

F. Tile Standard: ASTM F 1700 – LVT-5

1. Class: Class III, Printed Film Vinyl Tile.
2. Type: B, Embossed Surface.

G. Thickness: 4.5 mm.

H. Size: 9.845” x 39.38”

I. Colors and Patterns: As indicated on drawings.

2.3 RUBBER FLOOR TILE - RT

A. Tarkett/Johnsonite Color Splash

B. Tile Standard: ASTM F 1344, Class I-B, Homogeneous Rubber Tile, through mottled.

C. Hardness: Grade 1, minimum hardness of 85, measured using Shore, Type A durometer according to ASTM D 2240.

D. Wearing Surface: Hammered.

E. Thickness: 2 mm.

F. Size: 24 by 24 inches (610 by 610 mm).

G. Seamless-Installation Method: Manufacturer suggested installation methods..

H. Colors and Patterns: As indicated on drawings.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

D. Joint Sealant for Resilient Terrazzo Floor Tile: Silicone sealant of type and grade recommended in writing by floor tile manufacturer to suit resilient terrazzo floor tile.
   1. Joint-Sealant Color: Match floor tile.

E. Sealers and Finish Coats for Resilient Terrazzo Floor Tile: Products recommended by floor tile manufacturer for resilient terrazzo floor tile.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install floor tiles until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern of colors and sizes indicated.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to fuse sections permanently into a seamless flooring installation. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply Manufacturer’s suggested requirements.

E. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.

F. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor tile surfaces before applying liquid cleaners, sealers, and finish products.

1. Sealer: Apply two base coats of liquid sealer.
2. Finish: Apply Manufacturer’s suggested requirements coats of liquid floor finish.

G. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096536 - STATIC CONTROL RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Electro-Static Dissipative Rubber tile flooring.

B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections: Related work specified elsewhere includes but may not be limited to
   1. Section 017704 - Closeout Procedures and Training.
   2. Section 033000 - Cast-In-Place Concrete.
   3. Section 096500 - Resilient tile for base.
   4. Section 271100 - Communications Equipment Room Fittings.

1.2 REFERENCES

A. References (Industry Standards)
   1. American National Standards Institute
      a. ANSI ESD S97.2 Floor Materials and Footwear – Voltage Measurement on a Person
      b. ANSI ESD S7.1 Resistive characterization of materials – Floor materials
      c. ANSI ESD S97.1-1 Floor materials and footwear resistance in combination with a person
   2. American Society for Testing and Materials
      a. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
      b. ASTM D2240 Standard Test Method for Rubber Property – Durometer Hardness
      c. ASTM D2047 Slip Resistance – Static Coefficient of Friction
      d. ASTM D3389 Abrasion Resistance – Taber Abrasion Test
      e. ASTM D6499 Standard Test Method for The Immunological Measurement of Antigenic Protein in Natural Rubber and its Products
      f. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
      g. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
      h. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
      i. ASTM E2180 Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) in Polymeric or Hydrophobic Materials
      j. ASTM F150 Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring

k. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
l. ASTM F925 Standard Test Method for Resistance to Chemicals of Resilient Flooring
m. ASTM F970 Standard Test Method for Static Load Limit
n. ASTM F1344 Standard Specification for Rubber Floor Tile
o. ASTM F1859 Standard Specification for Rubber Sheet Floor Covering Without Backing
p. ASTM F2055 Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gage Method
q. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ Probes
r. ASTM F2199 Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile after Exposure to Heat

3. National Fire Protection Association
   a. NFPA 253 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
   b. NFPA 258 Test Method for Specific Density of Smoke Generated by Solid Materials

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Procedures for submittals.
   a. Product Data: Data describing physical and performance characteristics; including sizes, patterns and colors including manufacturer's product sheet.
      a. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors, patterns and textures.
      b. Samples: Submit selection and verification samples for finishes, colors, and textures.
      c. Quality Assurance Submittals: Submit the following:
         1) Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
         2) Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.
         3) Manufacturer's Instructions: Manufacturer's installation instructions.
      d. Closeout Submittals: Submit the following:
         1) Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
         2) Warranty: Warranty documents specified herein.

1.4 QUALITY ASSURANCE

A. Suppliers: Provide resilient flooring manufactured by a firm with a minimum of 10 years' experience with rubber flooring of types equivalent to those specified.
   1. Supplier capable of providing field service representation.

B. Installer Qualifications: Company specializing in performing work of this Section with minimum 5 years documented experience.
   1. Engage installer acceptable to the product manufacturer.

2. Certificate: When requested, submit certificate indicating qualification.

C. Regulatory Requirements:
   1. Critical Radiant Flux in Accordance with ASTM E 684: More than 0.45 Watts per square centimeter.
   2. Specific Optical Smoke Density in Accordance with ASTM E 662: Less than 450.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Transport, Handle, Store, and Protect Products.
B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
C. Deliver tiles and installation accessories to site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, project identification, and shipping and handling instructions.
D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
   1. Material should be stored in areas that are fully enclosed, weathertight with the permanent HVAC system set at a uniform temperature of at least 68 degrees F (20 degrees C) for 48 hrs. prior to, during, and after installation.
   2. Store tiles on flat surfaces.

1.6 SEQUENCING AND SCHEDULING

A. Finishing Operations: Install tile flooring after finishing operations, including painting and ceiling operations, have been completed.
B. Concrete Curing: Do not install tile flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by resilient flooring manufacturer's recommended bond, moisture test, and pH test.

1.7 WARRANTY

A. Manufacturer's Warranty: Submit, for USPS acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights USPS may have under Contract Documents.
   1. Warranty Period: One (1) year limited warranty against defects in manufacturing and workmanship commencing on Date of Substantial Completion.
   2. Provide manufacturers standard limited wear warranty/conductivity warranty as specified under each product as applicable.

1.8 MAINTENANCE

A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.

B. Maintenance Stock:
   1. Provide 1 box of extra floor tiles for each tile type, panel, and color.

2. Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels.

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN PRODUCT

A. Static control rubber flooring by ROPPE, ESD RUBBER, FIESTA, 24 X 24, Roppe Corporation, U.S.A., 1602 North Union Street, Fostoria, Ohio 44830-1158, Phone: 800.537.9527 – 419.435.8546, FAX: 419.435.1056

B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 RESILIENT TILE FLOORING

A. Rubber Tile for ESD Protection Control:

1. Basis of Design Product: ROPPE, ESD RUBBER, FIESTA, 24 X 24 X 2.0 mm THICK
2. Composition: Homogeneous rubber compound with a random scattered design.
3. Surface: Hammered
4. Conductivity Warranty: Lifetime conductivity.
5. Standard: ASTM F1344, Class 1, Type B, Grade 1.
6. Abrasion Resistance: Taber abrasion test, ASTM D3389, H-18-wheel, 500-gram load, 1000 cycles, gram weight loss not greater .50.
7. Hardness ASTM D2240, Shore A, greater than 81.
8. Slip Resistance: Static coefficient of friction (James Test): ASTM D2047, equal to or greater than 0.6, ADA guidelines compliance.
9. Flammability: ASTM E648; NFPA 253; NBSIR 75 950 result to be not less than 0.45 watts per square centimeter, Class 1.
10. Smoke Density: ASTM E662, NFPA 258, NBS smoke density, less than 450.
11. Conductivity: $\leq$1.0x10E6 resistance to ground when tested according to ASTM F 150/ESD.S7.1-2005 under >30% relative humidity at room temperature.
12. Static Generation: <20 volts when tested according to ESD STM 97.2.
13. System resistance: <35x10E6 ohms when tested according to ANSI/ESD S97.1-12006. Floor Materials and Footwear Resistance in Combination with a Person. Meets recommended range of ANSI/ESD S20.20-2007
14. Color: Presto
15. Dimensional Stability: ASTM F2199, $\leq$ 0.15% in both directions
16. Static Load: ASTM F970, Residual compression of 0.003” with 800 lbs. achieved, $\leq$ 0.005” with 250 lbs. required
17. Elongation: ASTM D412 Modulus @ 10% is 1196.7 lbs. per sq. inch achieved, $\geq$ 300 lbs. per sq. inch is required
18. Cleaning: Cleaned and maintained effectively using water, cleaning pads and a suitable cleaning machine, without the use of any factory and/or field-applied coatings or without using any chemicals that may be hazardous or containing any teratogenic, mutagenic or any other ingredients known to be carcinogenic.

2.3 ACCESSORIES

A. Subfloor Filler or Leveling Compound: Portland Cement based underlayment, providing a minimum 3500 PSI compressive strength and sufficient bond to existing subfloor.
   1. Underlayment and Patching Compound: Equivalent to Ardex, Laticrete, or Mapei and shall be installed per manufacturer's instructions.

B. Primers and Adhesives: Conductive type as provided by resilient flooring manufacturer for specific material and substrates encountered.

C. Expansion Joint Covers: Refer to other specification section for expansion joint covers to be used with resilient flooring.

D. Copper Grounding Strip: 2 inches wide

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017300 - Execution: Verification of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work and are acceptable for product installation in accordance with manufacturer's instructions.

C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

E. Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed and shall not be considered as a legitimate claim.

3.2 PREPARATION

A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

B. Surface Preparation:
   1. General: Prepare floor substrate in accordance with manufacturer's instructions.
   2. Floor Substrate: Prepare floor substrate to be smooth, rigid, flat, level, permanently dry, clean and free of foreign materials such as dust, paint, grease, oils, solvent, curing and hardening

compounds, sealers, asphalt and old adhesive residue.

3. Concrete Floor Substrate: Concrete floor substrate shall have a minimum compressive strength of 3500 psi. Refer to Division 3 Concrete sections for patching and repairing crack materials, and leveling compounds with Portland cement-based compounds. Do not use or install flooring over gypsum based leveling or patching materials
4. Reference Standard: Comply with ASTM F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
   a. Concrete floors with steel troweled (slick) finish shall be properly roughened up (sanded) to ensure suitable adhesion.
   b. Concrete floors with curing, hardening, and breaking compounds shall be abraded with mechanical methods only to remove compounds. Use Blastrac or similar equipment.

C. Concrete Moisture Test:
1. ASTM F1869-98 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub Floor Using Anhydrous Calcium Chloride: The moisture emission from the concrete shall not exceed 3.0 lbs. per 1000 sq. ft. in 24 hrs (verify using the calcium chloride test as per ASTM F 1869-98). A diagram of the area showing the location and results of each test shall be submitted to the Contracting Officer. If the test results exceed the limitations, the installation shall not proceed until the problem has been corrected. Perform minimum 1 test per 1,000 S.F.
2. ASTM F2170-02 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes. The relative humidity measured from the center of the concrete slab should not exceed 75%. If the test results exceed the limitations, the installation must not proceed until the problem has been corrected.
3. The test area shall be conditioned with the permanent HVAC system set at a uniform temperature of at least 68 degrees F (20 degrees C) for 72 hrs prior to and during testing.

D. Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than 10, it must be neutralized prior to beginning the installation.

E. Perform adhesive bond test in each major area, minimum 1 per 1,000 square feet, prior to installation. Examine after 72 hours to determine whether bond is solid, and no moisture is present. Do not proceed with work until results of bond test are acceptable.

F. Attach one copper ground connection as follows: minimum one copper ground strap per 2,000 square feet. Refer to paragraph 3.4.

G. Prohibit traffic until filler is cured.

H. Vacuum clean substrate.

3.3 INSTALLATION - TILE FLOORING

A. Install resilient tile flooring and grounding in accordance with manufacturer's published instructions referenced above.
1. Installation environment should be conditioned to a constant temperature and humidity conditions. Site should have permanent windows and doors, fully enclosed, weather tight with permanent HVAC system (not temporary) set at a uniform temperature of at least 68 degrees F (20 degrees C) for 48 hours prior to, during, and 72 hours after installation.

B. Open number of floor tile cartons to provide quantity of flooring material required to cover each area; mix tile pieces to ensure shade variations do not occur within any one area.

C. Spread only enough adhesive to permit installation of floor materials before initial set.

D. Set flooring in place, press with a 100-pound resilient flooring roller to attain full adhesion.

E. Lay flooring from center marks established parallel to building walls.
   1. Allow minimum 1/2 full size tile width at room or area perimeter.
   2. Adjust tile layout as required to avoid use of units less than 1/2 tile.

F. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar. Where flooring continues through door opening, continue established pattern with no interruption.

G. Install edge strips at unprotected or exposed edges where flooring terminates.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

I. Extend flooring into toe spaces, door reveals, closets, and similar openings.

J. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specifications sections for expansion joint covers.

K. Adhere resilient flooring to flooring substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed flooring installation.
   1. Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.

L. The specified resilient tiles are factory finished; no finishing is required after installation. Refer to manufacturer's instructions referenced above for detailed recommendations for initial and restorative maintenance.

3.4 GROUNDING

A. In order to properly dissipate static electricity, the flooring system must be grounded with copper grounding straps installed per the flooring manufacturer's guidelines and the following standards:
   1. Motorolla R56 and ATIS-0600321 (2010) Grounding Standards
   2. ANSI/ESD-S7.1 (2006) Test Parameters

B. Copper grounding straps shall be placed every 2,000 s.f. of room size; at least one strap per room within the telecommunications equipment room (ER) and telecommunications rooms (TRs).
   1. Copper strap shall be at least 18 inches in length with at least 9 inches embedded into the floor adhesive. Provide copper strap to meet the flooring manufacturers' guidelines and recommendations.
   2. All cracks, joints and voids within the floor shall be bridged with a copper strap. Center strap over crack, joint or void and embed copper strap inside adhesive to anchor in place. Ensure

copper strap will make contact with each side of crack, joint or void.

3. Extend copper strap up wall, behind wall base and bond to the “primary bonding busbar” (PBB) within the telecommunications equipment room (ER) using a #10/THWN/CU ground conductor.
   a. Those CSF’s equipped with telecommunications rooms (TR’s) shall have their grounding straps bonded to the “secondary bonding busbars” (SBB’s) using #10/THWN/CU ground conductors.

C. The floor grounding system shall be installed and tested by a qualified Electrical Contractor. The resistance to ground measured using the test method of ANSI/ESD-S7.1 (2006) shall not be less than 1,000 megaohms or more than 1,000,000 megaohms.

3.5 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality:
   1. Temporary ventilation: As specified in Section 013543 - Environmental Procedures.
      a. Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of minimum 60 degrees F to maximum 90-degree F continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by USPS Project Manager.

3.6 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspection.
   1. Manufacturer's Field Services: Upon USPS request and with at least 2-3-week notice, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

B. Inspect resilient flooring and base installation, pattern, layout, and attachment to substrate.

3.7 CLEANING

A. Section 017300 - Execution: Cleaning installed Work.
B. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to USPS acceptance. Remove construction debris from project site and legally dispose of debris.
   1. Remove visible adhesive and other surface blemishes using cleaning methods recommended by tile floor manufacturer.
   2. Sweep and vacuum floor after installation.
   3. Clean surfaces only after adhesive has fully cured, no sooner than 72 hours after installation. Clean surfaces using non-abrasive materials and methods recommended by manufacturer. Remove and replace work that cannot be successfully cleaned.

3.8 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

END OF SECTION

USPS CSF Specifications issued: 10/1/2019
Last revised: 8/27/2018

SECTION 096710 - EPOXY FLOOR COATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Epoxy floor coating

B. Related Sections include the following:
   1. Division 3 Section “Concrete” for concrete substrates to receive resinous flooring.

1.3 SUBMITTALS FOR REVIEW

A. Product Data: For each type of product specified. Include manufacturer’s technical data, installation instructions, and recommendations for each epoxy floor coating system component required.

B. Samples for Verification: Of each epoxy floor coating system required, 6 inches (150 mm) square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

1.4 SUBMITTALS FOR INFORMATION

A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

B. Material Certificates: Signed by manufacturers certifying that materials furnished comply with requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Maintenance Data: For epoxy floor coating system to be included in maintenance manuals.

B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable to resinous flooring manufacturer.
   1. Engage an installer who employs only persons trained and approved by resinous flooring manufacturer or installing resinous flooring systems specified.

B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

1.7DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.8PROJECT CONDITIONS

A. Environmental Limitations: Comply with epoxy floor coating system manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during epoxy floor coating system installation.

C. . Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1MANUFACTURERS

A. Products: Subject to compliance with requirements, provide products by one of the following manufacturers:
1. Dex-O-Tex; Division of Crossfield Products Corporation: Decor-Flor.
2. BASF Construction Chemicals, LLC.: Selbatwede 41.
3. Sika Corporation: Sikafloor Quartzite 6000.
4. Tnemec Company, Inc; StrataShield Series 222 Deco-Tread system. Tnemec, P.O. Box 165770, North Kansas City, MO 64116, 1(800) TNEMEC-1.
5. Dur-A-Flex, Inc.: Dur-a-Quartz Epoxy Flooring System.

2.2 MATERIALS

A. Epoxy Floor Coating: Resinous floor surfacing system consisting of primer; body coat(s) including resin, hardener, aggregates, and colorants, if any; and sealing or finish coat(s).

B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1EXAMINATION

A. Verify floor and lower wall surfaces are free of substances that may impair adhesion of adhesive and finish materials, adhesive and finish materials.

3.2PREPARATION

A. General: Prepare and clean substrate according to resinous flooring manufacturers written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form release agents, dust, dirt, grease, oil, and other contaminates incompatible with epoxy floor system.

1. Test for moisture vapor transmission. The recognized methods are:
   a. ASTM-F-1869-04: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride: The maximum allowed water/vapor transmission rate is 3 pounds per 1,000 sq. ft. per 24 hours.
   b. ASTM F-2170-02: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes: This test measures the relative humidity in the slab below the surface. If taken over a period of time, it will show the rate of drying in the slab. The maximum relative humidity should be below 80%.
   c. ASTM-D-4263-83(2005): Plastic Sheet Test: This test gives an indication that moisture may be present.
2. Old Concrete: Old concrete surfaces must be structurally sound. Any unsound areas must be repaired prior to proceeding with the resinous installation. For proper patching and repairing, remove existing paint, scale and loose concrete by rough sanding, sandblasting, shot blasting, or grinding. In some cases where plant conditions allow, a stripper may be used to remove excessive build-up of paints or sealers. Remove any contamination. Use vacuum shot blasting to achieve a good bonding profile. Before Examined for moisture vapor transmission using any of the approved tests:
   a. ASTM-F-1869-04: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   b. ASTM-F-2170-02: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.
   c. ASTM-D-4263-83(2005): Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method. This test is only an indication and should not be used to determine moisture migration.
3. Other ASTM Tests which are applicable to concrete preparation are:
   a. ASTM-D-4258-05 Standard Practice for Surface Cleaning Concrete for Coating.
   b. ASTM-D-4259-88(2006) Standard Practice for Abrading Concrete.
   c. ASTM-D-4260-05 Standard Practice for Acid Etching Concrete.
   d. ASTM-D-4261-05 Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating.
   e. ASTM-C-811-98(2003) Standard Practice for Surface Preparation of Concrete for Application of Chemical Resistant Resin Monolithic Surfacing.
4. New Concrete: New concrete must be well cured and dry prior to coating. Allow to cure a minimum of 28 days unless using green concrete primer. No curing agents or sealing compounds should be used at any time prior to coating. A light steel trowel finish is recommended when finishing the concrete surface.
   a. Any oil, grease, laitance, or other foreign material must be removed.
   b. Steam clean with a strong degreaser such as tri-sodium phosphate.
   c. Laitance and other foreign material shall be removed by mechanical methods such

as vacuum blasting, scarification, or grinding.

d. All new concrete shall be mechanically prepared by vacuum shotblasting. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.

e. Before the installation of epoxy resinous system, the surface should be examined for moisture. Use tests noted above for old concrete.

5. Repair damaged and deteriorated concrete according to resinous flooring manufacturers written recommendations.

6. Comply with the requirements noted above unless manufacturers' written instructions are more stringent.

7. Repair damaged and deteriorated concrete according to resinous flooring manufacturers written recommendations.

C. Resinous Materials: Mix components and prepare materials according to epoxy floor coating manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturers written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks form reflecting through resinous flooring according to manufacturers written recommendations.

F. Perform Anhydrous Calcium Chloride Test in accordance with ASTM F 1869-04 once for every 1,000 square feet of surface to be coated. The maximum limit for moisture vapor emissions rate shall be 3.0 lbs. per 1,000ft sq. per 24-hour period. If tests indicate rates higher than 3.0 lbs. per 1,000ft sq. 1,000ft sq. per 24-hour period, a water vapor reduction system shall be applied to the substrate. The water vapor reduction system shall be Koester VAP 1 2000 System by Koester American Corporation, 2585 Aviator Drive, Virginia Beach, VA 23453, 1 (757) 425-1206, or equivalent.

G. Any repairs to the concrete substrate that are required prior to installation of the epoxy floor coating system shall comply with the International Concrete Repair Institute (ICRI) Guideline 03732 CSP 3-4.

3.3APPLICATION

A. General: Apply components of epoxy floor coating system according to manufacture’s written instructions to product a uniform, monolithic wearing surface of thickness indicated.
   1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.
   2. Cure resinous flooring components according to manufacturer's written instruction. Prevent contamination during application and curing processes.
   3. At substrate expansion and isolation joints, provide joint in epoxy floor coating system to comply with epoxy floor coating manufacturer's written recommendations.

B. Epoxy Floor Coating
   1. Apply primer over prepared substrate at manufacturers recommended spreading rate.
   2. Apply reinforcing membrane to substrate cracks.

3. Apply self-leveling slurry body coat(s) to minimum thickness minimum 3/16 inch thickness. Provide body coat of resin using roller, squeegee of trowel. Broadcast pre-mixed grains to saturation.
   a. Broadcast aggregates and after resin is cured, remove excess aggregates to provide surface texture indicated.
4. Apply grout coat and topcoat at manufacturers recommended coverage to provide uniform, dense, slip resistant surface.
5. Allow proper cure time for each installation step.
6. Integral Cove Base: Apply cove base mix to wall surfaces at locations indicated. Round internal and external corners. Install cove base according to manufacturers written instructions and details including taping, mixing, priming, troweling, sanding and top coating of base.

3.4CLEANING AND PROTECTING

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

B. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

END OF SECTION 096710

SECTION 096766 - FLUID-APPLIED ATHLETIC FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Polyurethane flooring fluid-applied directly on substrates.
2. Polyurethane flooring fluid-applied over base mats.

B. Related Sections:

1. Section 096513 "Resilient Base and Accessories" for wall base and accessories installed with fluid-applied athletic flooring.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation details for flooring including layout, colors, widths, and dimensions of game lines and markers and locations of athletic equipment floor inserts.

C. Samples for Initial Selection: Manufacturer's color charts showing colors and glosses available for flooring and game-line and marker paints.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fluid-applied athletic flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An Installer (Applicator) who is approved, trained, or certified by fluid-applied athletic flooring manufacturer.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Comply with flooring manufacturer's written instructions for substrate temperature, ambient temperature, humidity, ventilation, and other conditions affecting flooring application.

1. Do not apply flooring until spaces are enclosed and weatherproof; wet work in spaces is complete and dry; and overhead work, including installing mechanical systems, lighting, and athletic equipment, is complete.
2. Maintain temperatures during installation within range recommended in writing by manufacturer, in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
3. After installation period, maintain temperatures within range recommended in writing by manufacturer.
4. Close spaces to traffic during flooring installation.

PART 2 - PRODUCTS

2.1 DIRECT-APPLIED FLOORING

A. Products: Subject to compliance with requirements, provide the following:

1. SIKA Pulastic Classic Line – Classic 100.

B. Description: Fluid-applied athletic flooring system consisting of primer and polyurethane body and top coats applied directly to substrate.

C. Materials:

1. Primer: Manufacturer's primer recommended for substrate indicated.

D. Finishes:

1. Color: As selected by Architect from manufacturer's full range.
2. Surface Texture: Manufacturer's standard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Concrete Substrates: Prepare substrates according to manufacturer's written instructions to ensure adhesion of flooring.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners. Remove contaminants using mechanical means.
2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
3. Moisture Testing:

    a. Perform moisture testing as required by Manufacturer’s written instruction.

B. Remove substrate coatings and other substances that are incompatible with flooring and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.

C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates, as required.

D. Treat nonmoving substrate cracks and control joints to prevent cracks from telegraphing (reflecting) through flooring according to manufacturer's written instructions.

E. Protect substrate voids and joints to prevent flooring resins from flowing into or leaking through them.

F. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.

1. Do not install flooring until it is same temperature as space where it is to be installed.

G. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.

H. Proceed with installation only after unsatisfactory conditions have been corrected.

I. Protect walls, floor openings, athletic equipment inserts, electrical openings, door frames, and other obstructions during installation. Cover floor and wall areas at mixing stations.

3.3 FLOORING INSTALLATION, GENERAL

A. General: Mix and apply flooring components according to manufacturer's written instructions.

1. At substrate expansion, isolation, and other moving joints, install continuous joint of same width through flooring.

3.4 INSTALLATION OF DIRECT-APPLIED FLOORING

A. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

B. Apply body coat(s) and topcoat to produce a uniform, level surface and finish.

3.5 PROTECTION

A. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.

B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096766

SECTION 096800 - CARPET

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes carpet and installation.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 3 Sections for curing compounds and other concrete treatments compatibility with carpet adhesives.
   2. Division 9 Section "Resilient Tile Flooring" for related materials and installation.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of carpet material and installation accessory specified. Submit manufacturer's printed data on physical characteristics, durability, fade resistance, and fire-test-response characteristics. Submit methods of installation for each type of substrate.

C. Samples for initial selection in the form of manufacturer's color charts or Samples of materials showing the full range of colors, textures, and patterns available for each type of carpet indicated.

D. Maintenance data for carpet and cushion to include in the operation and maintenance manual specified in Division 1. Include the following:
   1. Methods for maintaining carpet and carpet cushion, including manufacturer's recommended frequency for maintaining carpet.
   2. Precautions for cleaning materials and methods that could be detrimental to finishes and performance. Include cleaning and stain-removal products and procedures.
   3. Certificate of Compliance: Carpet manufacturer shall provide a certified statement issued to the Okaloosa County School Board of Education stating the particular fabric supplied and used meets or exceeds the tests listed below for this installation.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is certified by the Floor Covering Installation Board (FCIB) or who can demonstrate compliance with FCIB certification program requirements.

B. Single-Source Responsibility: Obtain each type of carpet from one source and by a single manufacturer.

C. Carpet Fire-Test-Response Characteristics: Provide carpet with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify carpet with appropriate markings of applicable testing and inspecting agency.
   1. Surface Flammability: Passes CPSC 16 CFR, Part 1630.
   2. Flame Spread: 25 or less per ASTM E 84-06.
   3. Smoke Developed: 450 or less per ASTM E 84-06.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 5: "Storage and Handling."

B. Deliver materials to Project site in original factory wrappings and containers, labeled with identification of manufacturer, brand name, and lot number.

C. Store materials on-site in original undamaged packages, inside well-ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity. Lay flat, with continuous blocking off ground.

1.6 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6: "Site Conditions."

B. Space Enclosure and Environmental Limitations: Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

C. Subfloor Moisture Conditions: Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours (14.6 kg/1000 sq. m/24 hours) when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F (12.7 deg C).

D. Subfloor Alkalinity Conditions: A pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied.

1.7 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Carpet Warranty: Submit a written warranty executed by carpet manufacturer and Installer agreeing to repair or replace carpet that does not meet requirements or that fails in materials or

workmanship within the specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination (regardless of whether or not chair pads are used).

C. Warranty Period: 5 years from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.
   1. Carpet: Before installation begins, furnish quantity of full-width units equal to 5 percent of amount installed.

PART 2 - PRODUCTS

2.1 CARPET

A. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are limited to, the products specified in each carpet Product Data sheet at end of this Section.

2.2 INSTALLATION ACCESSORIES

A. Concrete-Slab Primer: Nonstaining type as recommended by the following:
   1. Carpet manufacturer.

B. Trowelable Underlayments and Patching Compounds: As recommended by the following:
   1. Carpet manufacturer.

C. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet as recommended by the following:
   1. Carpet manufacturer.

D. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine subfloors and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of carpet. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Verify that subfloors and conditions are satisfactory for carpet installation and comply with requirements specified in this Section and those of the following:
   1. Carpet manufacturer.

3.2 PREPARATION

A. General: Comply with carpet manufacturer's installation recommendations to prepare substrates indicated to receive carpet installation.

B. Level subfloor within 1/4 inch in 10 feet (6 mm in 3 m), noncumulative, in all directions. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions.
   1. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as recommended by the following:
      a. Carpet manufacturer.

C. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.

D. Broom or vacuum clean subfloors to be covered with carpet. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.

E. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended by the following:
   1. Carpet manufacturer.

3.3 INSTALLATION

A. Direct Glue-Down Installation: Comply with CRI 104, Section 8: "Direct Glue-Down."

B. Comply with carpet manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Do not bridge building expansion joints with continuous carpet.

C. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

D. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

E. Install pattern parallel to walls and borders.

3.4 CLEANING

A. Perform the following operations immediately after completing installation.
1. Remove visible adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove protruding yarns from carpet surface.
3. Vacuum carpet using commercial machine with face-beater element.

3.5 PROTECTION

A. General: Comply with CRI 104, Section 15: "Protection of Indoor Installation."

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure carpet is without damage or deterioration at the time of Substantial Completion.

PRODUCT DATA SHEET 1 - CARPET

A. Fiber Content: Solution dyed nylon, all from the same dye lot.

B. Face Construction: Dense Loop.

C. Gauge: 1/8 INCH (3.2 mm).

D. Stitches: 8.7 PER INCH (8.7 per 25.4 mm).

E. Pile Height: .171 INCHES (4.4 mm) for finished carpet.

F. Surface Pile Weight: 28 OZ./SQ. YD. (g/sq. m). THIS DOES NOT INCLUDE WEIGHT OF BACKINGS.

G. Total Weight: 67 OZ./SQ. YD. (g/sq. m) for finished carpet.

H. Primary Backing: Woven polypropylene.

I. Secondary Backing: Unitary
   1. Width: 12 FEET (m)

K. Performance Characteristics: As follows:
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648-08.
   2. Tuft Bind: Not less than 20 lbf (89.0 N) per ASTM D 1335-05.
   3. Dry Breaking Strength: Not less than 100 lbf (445 N) per ASTM D 2646-05.
   4. Delamination Strength of Secondary Backing: Not less than 2.5 lbf/inch (11.1 N/25.4 mm) per ASTM D 3936-05.
   5. Resistance to Insects: Comply with AATCC-24.
   6. Static Resistance: Not less than 500,000 ohms, nor more than 20,000 megohms, measured according to the test method for conductive flooring specified in Chapter 12 of NFPA 99.
   7. Static Generation: Less than 3.0 kv at 20 percent relative humidity, per AATCC-134 using step and scuff tests with neolite and chrome-tanned leather soles.

L. Acceptable Products:
   1. J&J Commercial, Division of J&J Industries - Certificate IV;
   2. Shaw Industries Group, Inc. - Shaw/Stratton, Patcraft.
   3. Mohawk Industries, Inc. - Mohawk Group, Karastan Commercial, Bigelow Commercial, Mohawk Commercial, Lees Carpets.

M. Color and pattern shall be as selected by the TPM.

END OF SECTION 096800

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes modular carpet tile.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for removing existing floor coverings.
2. Section 096513 "Resilient Base and Accessories" Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.

2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

D. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

F. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to [5] <Insert number> percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI's "CRI Carpet Installation Standard."

1.9 FIELD CONDITIONS

A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

a. More than 10 percent edge raveling, snags, and runs.
b. Dimensional instability.
c. Excess static discharge.
d. Loss of tuft-bind strength.
e. Loss of face fiber.
f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE - CPT

A. Tarkett, Pattern: Longitude

B. Color: As indicated on drawings.

C. Pattern: As indicated on drawings.

D. Fiber Content: 100 percent nylon 6, 6.

E. Fiber Type: Post Consumer Nylon.

F. Pile Characteristic: Level-loop pile.

G. Density: 5,684 OZ/CU YD.

H. Pile Thickness: 0.010 inch for finished carpet tile.

I. Stitches: 8.00 inch.

J. Gage: 1/12 per inch.

K. Total Weight: 15 oz/yard for finished carpet tile.

L. Primary Backing/Backcoating: Manufacturer's standard composite materials.

M. Secondary Backing: Manufacturer's standard material.

N. Backing System: Glasbac.

O. Size: 19.69” X 19.59 inches.

P. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.
2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:
    a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
    b. Sustainable Product Certification: Gold level certification according to ANSI/NSF 140.

Q. Performance Characteristics:

1. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D 7330.
2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.
4. Tuft Bind: Not less than 8 lbf (36 N according to ASTM D 1335.
5. Delamination: No delamination according to ASTM D 3936.
6. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Noise Reduction Coefficient (NRC): <Insert NRC> according to ASTM C 423.
9. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.

10. Colorfastness to Light: Not less than 4 after AFU (AATCC fading units) according to AATCC 16, Option E.
11. Electrostatic Propensity: Less than 1.5 kV according to AATCC 134.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

C. Metal Edge/Transition Strips: Extruded aluminum with [mill] <Insert finish> finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Wood Subfloors: Verify the following:

1. Underlayment over subfloor complies with requirements specified in Section 061600 "Sheathing."
2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

E. Metal Subfloors: Verify the following:

1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

F. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.

1. Access Flooring Systems: Verify the following:
2. Access floor substrate is compatible with carpet tile and adhesive if any.
3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch (3 mm), protrusions more than 1/32 inch (0.8 mm), and substances that may interfere with adhesive bond or show through surface.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 098433 - SOUND-ABSORBING WALL UNITS

1.1 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics:

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.
3. Fire Growth Contribution: Tested according to NFPA 265.

1.2 WARRANTY

A. Materials and Workmanship: Two years.

1.3 SOUND-ABSORBING WALL UNITS

A. General: Manufacturer's standard construction with facing material.

1. Low-Emitting Materials: Panels comply with requirements of LEED.

B. Sound-Absorbing Wall Panels:

1. Basis-of-Design Product: Armstrong Tectum Designart
2. Mounting: Edge mounted with splines secured to substrate – C-401.
3. Core Materials: Manufacturer's standard
4. Edge Construction: Manufacturer's standard
5. Corner Detail in Elevation: Square.
6. Reveals between Panels: None.
7. Facing Material: as indicated on drawings.
8. Nominal Overall Panel Thickness: 1 inch .
9. Panel Width: 24” x 48”
10. NRC: 0.85

SECTION 099000 - PAINTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and field painting of the following:

1. Exposed exterior items and surfaces.
2. Exposed interior items and surfaces.
3. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the TPM will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and ironwork, and primed metal surfaces of mechanical and electrical equipment.

C. Do no paint prefinished items, concealed surfaces, finished metal surfaces, operating parts and labels.

1. Prefinished items include the following factory-finished components:
    a. Architectural woodwork and casework.

F. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Furred areas
b. Ceiling plenums
c. Pipe spaces
d. Duct shafts

2. Finished metal surfaces including the following:
    a. Anodized aluminum
    b. Stainless steel
    c. Chromium plate
    d. Copper

e. Bronze and brass

3. Operating parts including moving parts of operating equipment and the following:

a. Valve and damper operators

b. Linkages

c. Sensing devices

d. Motor and fan shafts

4. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code required labels or equipment name, identification, performance rating or nomenclature plates.

D. Related Sections including the following:

1. Division 5 Section “Metal Fabrications” for shop priming ferrous metal.

2. Division 8 Section “Steel Doors and Frames” for shop priming of steel. Division 8 Section “Flush Wood Doors” for factory finishing of wood doors.

3. Division 9 Section “ Gypsum Board Assemblies” for surface preparation for gypsum board.

4. Division 15 and 16 “Painting of mechanical and electrical work is specified in Division 15 and 16, respectively, Sections for specific details.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16-07 apply to this Section.

B. DFT: Dry film thickness

1. Min.: Minimum

1.4 SUBMITTALS

A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. For Review:

1. Product Data: For each paint system specified. Include block fillers and primers.

2. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer’s catalog number and general classification.

3. Samples for Initial Selection: Manufacturer’s color charts showing the full range of colors available for each type of finish-coat material indicated.

4. After color selection, the TPM will furnish color chips for surfaces to be coated.

C. For Information Only:

1. Certification by manufacturer that products supplied complies with local regulations controlling use of volatile organic compounds (VOCs).

2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coat material proposed for use.

D. For Closeout: Submit following in accordance with Division 1 Section Closeout:

1. Product data

2. Manufacturer's maintenance and cleaning instructions.

3. Extra stock for Owner's maintenance.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from same manufacturer as finish coats.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and following information:

1. Product name or title of material
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions
6. Application instructions
7. Color name and number
8. VOC content

B. Store materials not in use in tightly covered containers in a well-ventilated area at minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application

1.7 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7.2 and 35 deg C).

C. Do not apply paint:

1. In rain, fog, nor mist.
2. When relative humidity exceeds 85 percent
3. At temperatures less than 5 deg F (3 deg C) above dew point.
4. To damp nor wet surfaces.

D. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra material to the Owner.

1. Quantity: Furnish the Owner with extra paint materials in the quantities indicated below:
    a. Four, one-gallon cans of each type material and color specified.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:

1. Paint System Manufacturers:
    a. ICI Paint Stores (ICI)
    b. Benjamin Moore & Co. (Moore)
    c. PPG Industries, Inc. (PPG)
    d. Sherwin-Williams Co. (S-W)
2. Special Coating System Manufacturers:
    a. Ameron International Corporation; Ameron Protective Coatings Group.
    b. ICI Paint Stores (ICI)
    c. Sherwin-Williams Co. (S-W)

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: Provide color selections made by the TPM.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operation in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surfaces treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

2. Cementitious Materials: Prepare concrete slabs, concrete masonry block, and cement plaster surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils and

release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

3. Wood: Clean surfaces of dirt, oil and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surface with putty or plastic wood filler. Sand smooth when dried.

b. Prime wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood.

4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

a. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.

b. Touch up bare areas and shop applied prime coats that have been damaged. Wire-brush; clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as remove surface film and strain material before using.

3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. Term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, and similar components are in place. Extend coatings in these areas, as required to maintain the system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
7. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors to tops, bottoms and side edges same as exterior faces.
9. Sand lightly between each succeeding enamel or varnish coat.
10. Apply sealers and coatings to finish concrete floor slabs as indicated.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions sand between applications.
2. Omit primer on metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color and appearance. Give special attention to ensure edges, corners crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the under coat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.

2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

3. Spray equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Mechanical items to be painted in finished areas include, but are not limited to, the following:

1. Piping, pipe hangers, and supports
2. Heat exchangers
3. Ductwork
4. Insulation
5. Motors and mechanical equipment
6. Accessory items

G. Electrical items to be painted in finished areas include, but are not limited to, the following:

1. Conduit and fittings
2. Switch gear
3. Panel boards

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, cooler appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

K. Completed Work: Match approved samples for color texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.5 CLEANING

A. Cleanup: At end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damaged by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 INTERIOR PAINT SYSTEMS

A. New Gypsum Drywall Ceilings; Flat Latex:

1. ICI:
   a. 1st Coat – 100 Dulux Ultra Basecoat Interior Latex Wall Primer
   b. 2nd Coat – 1201 Dulux Ultra Velvet Sheen Flat Latex.
2. Moore:
   a. 1st Coat – Moore's Latex Quick-Dry Primer Sealer #201
   b. 2nd Coat – Regal Wall Satin
3. Sherwin Williams:
   a. 1st Coat – Pro-Mar 200 Latex Wall Primer B28W8200
   b. 2nd Coat – Classic 99 Wall and Trim Paint A87W1151
4. PPG:
   a. 1st Coat – 17-10 Quick-Drying Interior Latex Primer-Sealer
   b. 2nd Coat – 80 Line Wallhide Interior Flat Latex Paint

B. New Gypsum Drywall; Eggshell Latex (P1):

1. ICI:
   a. 1st Coat – 1000 Dulux Ultra Basecoat Interior Latex Wall Primer
   b. 2nd Coat – 1403 Dulux Ultra Acrylic Eggshell Enamel
2. Moore:
   a. 1st Coat – Moore's Latex Quick-Dry Primer Sealer 201.
   b. 2nd Coat – Regal Aqua Velvet (319)

3. Sherwin Williams:
   a. 1st Coat – Classic 99 Latex Satin
   b. 2nd Coat – Classic 99 Latex Satin
4. PPG
   a. 1st Coat – 17-10 Quick-Drying Interior Latex Primer-Sealer
   b. 2nd Coat – 89 Line Manor Hall Eggshell Latex Wall and Trim Enamel

C. Existing Gypsum Drywall; Eggshell Latex (P1):
1. ICI:
   a. 1st Coat – 1403 Dulux Ultra Acrylic Eggshell Enamel
2. Moore:
   a. 1st Coat – Moore's Latex Quick-Dry Primer Sealer 201.
   b. 2nd Coat – Regal Aqua Velvet (319)
3. Sherwin Williams:
   a. 1st Coat – Classic 99 Latex Satin A87W1151
4. PPG
   a. 1st Coat – 89 Line Manor Hall Eggshell Latex Wall and Trim Enamel

D. Existing Concrete Masonry Units; Eggshell Latex Enamel (P2):
1. ICI:
   a. 1st Coat –1403 Dulux Ultra Eggshell Interior Enamel
2. Moore:
   a. 1st Coat – Regal AquaGlo Latex
3. Sherwin Williams:
   a. 1st Coat – Pro-Mar 400 Zero VOC Interior Latex Eggshell B20W4651
4. PPG:
   a. 1st Coat – 89 Line Manor Hall Eggshell Latex Wall and Trim Enamel.
   b. 2nd Coat – Interior/Exterior Enamel.
   c.

E. New Concrete Masonry Units; Eggshell Latex Enamel (P2):
1. ICI:
   a. 1st Coat – 3010 Ultra-Hide Interior/Exterior Latex Block Filler
   b. 2nd Coat – 1403 Dulux Ultra Eggshell Interior Enamel
2. Moore:

a. 1st Coat – Moorecraft Block Filler #173

b. 2nd Coat – Regal AquaGlo Latex

3. Sherwin Williams:

a. 1st Coat – Pro-Mar Block Filler, B25W1

b. 2nd Coat – classic 99 Latex Satin Enamel

4. PPG:

a. 1st Coat – 6-7 Speedhide Interior/Exterior Masonry Latex Clock Filler.

b. 2nd Coat – 89 Line Manor Hall Eggshell Latex Wall and Trim Enamel.

F. New Ferrous Metal, Factory Primed (Semi-Gloss):

1. ICI:

a. Touch Up – 4160 Devguard Multi-Purpose Metal Primer

b. 1st Coat – 1507 Dulux Ultra Semi Gloss Alkyd Enamel

c. 2nd Coat – 1507 Dulux Ultra Semi Gloss Alkyd Enamel

2. Moore:

a. Touch Up – Retardo Rust Inhibitive Paint 163

b. 1st Coat – Satin Imperavo 235 Enamel

c. 2nd Coat – Satin Imperavo 235 Enamel

3. Sherwin Williams:

a. Touch Up – Kem Kromic Universal Metal Primer B5026

b. 1st Coat – Pro Classic Satin Oil B34W51

c. 2nd Coat – Pro Classic Satin Oil B34W51

4. PPG:

a. Touch Up – Speedhide 6-712 Water Base Inhibitive Metal Primer

b. 1st Coat – 27 Line Wall hide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil

c. 2nd Coat – 27 Line Wallhide Low Order Interior Enamel Wall and Trim Semi-Gloss Oil

E. Interior Concrete Floor Slabs With Clear Sealer:

1. L&M Construction Chemicals, Inc.

a. Sealhard Clear Concrete Sealer

2. BASF

a. 1st Coat - SONOGUARD Base Coat

b. 2nd Coat – SONOGUARD Top Coat

3.8 EXTERIOR PAINT SCHEDULE

A. New Galvanized Metal; Gloss Alkyd:

1. ICI:
   a. 1st Coat – 4120 Devguard All Purpose Galvanized Metal Primer
   b. 2nd Coat – 4308 Devguard Industrial Alkyd Gloss Enamel
   c. 3rd Coat – 4308 Devguard Industrial Alkyd Gloss Enamel
2. Moore:
   a. 1st Coat – Ironclad Galvanized Metal Latex Primer
   b. 2nd Coat – Impervo High Gloss Enamel #133
   c. 3rd Coat – Impervo High Gloss Enamel #133
3. Sherwin Williams:
   a. 1st Coat – Galvite B50W3
   b. 2nd Coat – Industrial Enamel B-54
   c. 3rd Coat – Industrial Enamel B-54
4. PPG:
   a. 1st Coat – 90-709 Pitt Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel
   b. 2nd Coat – 6-282 Speedhide Interior/Exterior Gloss-Oil Enamel
   c. 3rd Coat – 6-282 Speedhide Interior/Exterior Gloss-Oil Enamel

B. New Ferrous Metal, Acrylic Enamel Over Previously Painted Items; Semi-gloss:

1. ICI:
   a. Touch Up – 4160 Devguard Multi-Purpose Metal Primer
   b. 1st Coat – 2406 Decra-Shield Semi-Gloss Latex
   c. 2nd Coat – 2406 Decra-Shield Semi-Gloss Latex
2. Benjamin Moore:
   a. Touch Up – Retardo Rust Inhibitive Paint 163
   b. 1st Coat – Impervex Enamel #309
   c. 2nd Coat – Impervex Enamel #309
3. Sherwin Williams:
   a. Touch Up – Kem Bond HS Universal Primer
   b. 1st Coat – DTM Acrylic coating Gloss (Waterborne) B66W100 Series

c. 2nd Coat – DTM Acrylic coating Gloss (Waterborne) B66W100 Series

4. PPG:

a. Touch Up – Speedhide 6-712 WaterBase Inhibitive Metal Primer

b. 1st Coat – 90 Line Pitt-Tech One Pack Interior/Exterior High Gloss DTM Industrial Enamel

c. 2nd Coat – 90 Line Pitt-Tech One Pack Interior/Exterior High Gloss DTM Industrial Enamel

3.9 INTERIOR SPECIAL COATING SCHEDULE

A. New Interior Concrete Masonry Units with High Build Epoxy Finish Coat:

1. Surface Preparation: Per following requirements:

a. Remove dust, dirt, mortar fins, daubs, and smears and other deleterious materials from surfaces to be coated.

b. ASTM D 4261-05 Surface Cleaning Concrete Unit Masonry for Coating.

2. Coating Application: Provide system by one of the following manufacturers.

a. Ameron:

1) 1st Coat – Amerlock 400 BF Block Filler, (min. 5.0 mils DFT)

2) 2nd Coat – Amerlock 400 High Build Epoxy Coating, (min. 6.0 DFT).

b. ICI Devoe Coatings:

1) 1st Coat – Bloxfil 4000 Heavy Duty Acrylic Block Filler (min. 6.0 mils DFT)

2) 2nd Coat – Devran 224HS High Build Epoxy (min. 6.0 mils DFT)

c. Sherwin Williams:

1) 1st Coat – Heavy Duty Block Filler B42W46, (min 10.0 mils DFT)

2) 2nd Coat – Macropoxy HS High Solids Epoxy (min 8.0 mils DFT)

B. New Interior Ferrous Metals, Unidentified Factory Primer with Epoxy Finish Coat:

1. Surface Preparation:

a. Remove dust, dirt and other deleterious materials from surfaces to be coated.

b. Minimum SSPC-SP3 Power Tool Cleaning to remove loose rust, paint film and other deleterious material from surfaces to be coated.

2. Coating Application: Provide system by one of the following manufacturers.

a. Ameron:

1) 1st Coat – Amercoat 185 HS Universal Primer (min 2.5 mils DFT)

2) 2nd Coat – Amerlock 400 High Build Epoxy (minimum 3.0 mils DFT)

C. New Gypsum Board with Epoxy Finish coat: (System SC3): Surface Preparation: Per following requirements:

1. Surface Preparation per following requirements:

   a. Remove dust, dirt and foreign matter.

2. Coating Application: Provide system by one of the following manufacturers.

   a. Ameron:

      1) 1st Coat – Amerlock 400 epoxy (2.5 mils DFT)

      2) 2nd Coat – Amerlock 400 epoxy (6.0 mils DFT)

   b. ICI Devoe Coatings:

      1) 1st Coat – Devran 224 HS High Build Epoxy (min 2.5 mils DFT)

      2) 2nd Coat – Devran 224 HS High Build Epoxy (min 6.0 mils DFT)

   c. Sherwin Williams:

      1) 1st Coat – Pro-Mar 200 Latex Wall Primer B28W200.

      2) 2nd Coat – Macropoxy HS High Solids Epoxy, (min 6.0 mils DFT)

END OF SECTION 099000

SECTION 100000 - WATER-BASED FIRE-SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-suppression piping, fittings, and appurtenances.
2. Fire department connections.
3. Hose connections and hose stations.
4. System control valves.
5. Fire-suppression piping specialties.
6. Cover systems for sprinkler piping.
7. Sprinklers.
8. Alarm devices.
9. Control panels.
10. Pressure gauges.

B. Related Requirements:

1. Section 331415 "Site Water Distribution Piping" for site fire-suppression water-service and backflow prevention devices.

1.2 DEFINITIONS

A. Standard-Pressure Fire-Suppression System Piping: Piping designed to operate at working pressure of 175 psigmaximum.

B. High-Pressure Fire-Suppression System Piping: Piping designed to operate at working pressure higher than standard 175 psig, but not higher than 250 psig.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles.
b. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Prepare in accordance with NFPA 13 section "Working Plans."

a. Include plans, elevations, and sections of the system piping and details.
b. Include detailed riser diagram and schematic diagram showing system supply, supply connection, devices, valves, pipe and fittings, as well as the delineation of the standard-pressure and high-pressure portions of the fire-suppression system.
c. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

2. Prepare computer-generated hydraulic calculations in accordance with the following:
   a. Name of hydraulic program used.
   b. Water supply information, including fire hydrant flow test data report.

3. Submit documents and calculations signed and sealed by qualified professional engineer responsible for their preparation and prepared by NICET Level III-certified technician, "Water-Based Systems Layout."
4. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Fire-suppression system plans and sections, or Building Information Model (BIM), drawn to scale, showing the items described in this Section and coordinated with all building trades.

B. Qualification Data: For qualified Installer and professional engineer and NICET-certified technician.

C. Design Data: Approved fire-suppression piping working plans, prepared in accordance with NFPA 13, including documented approval by AHJs, and including hydraulic calculations if applicable.

D. Welding certificates.

E. Field Test Reports:

1. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

2. Fire-hydrant flow test report.

F. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-suppression systems and specialties to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.
2. System control valves.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by qualified professional engineer.

B. Welding Qualifications: Qualify procedures and operators in accordance with ASME Boiler and Pressure Vessel Code.

1.8 FIELD CONDITIONS

A. Interruption of Existing Fire-Suppression Service: Do not interrupt fire-suppression service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary fire-suppression service in accordance with requirements indicated:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of fire-suppression service.
2. Do not proceed with interruption of fire-suppression service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Automatic wet-pipe sprinkler system.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Suppression System Components, Devices, and Accessories: Listed in UL's "Fire Protection Equipment Directory" and FM Approvals' "Approval Guide."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fire-suppression system equipment, specialties, accessories, installation, and testing to comply with NFPA 13 and ASME A17.1.

D. Standard-Pressure Piping System Component: Listed for 175 psig minimum working pressure.

E. High-Pressure Piping System Component: Listed for 250 psig minimum working pressure.

1. Fire-Hydrant Flow Test:

   a. Perform fire-hydrant flow test and record the following conditions:

      1) Date:
      2) Time:
      3) Performed by:
      4) Location of Residual Fire Hydrant R:
      5) Location of Flow Fire Hydrant F:
      6) Static Pressure at Residual Fire Hydrant R:
      7) Measured Flow at Flow Fire Hydrant F:
      8) Residual Pressure at Residual Fire Hydrant R:

   b. Fire-hydrant flow test must be performed within previous 6months prior to completion of design documents and hydraulic calculations.

2. Margin of Safety for Available Water Flow and Pressure: 20 percent, including losses through water-service piping, valves, and backflow preventers.
3. Sprinkler Occupancy Hazard Classifications:
   a. Educational: Light Hazard
   b. Electrical Equipment Rooms: Ordinary Hazard, Group 1
   c. Elevator Machine Room and Hoistway: Ordinary Hazard, Group 1 and 2
   d. General Storage Areas: Ordinary Hazard, Group 1
   e. Libraries, except Large Stack Rooms: Light Hazard
   f. Mechanical Equipment Rooms: Ordinary Hazard, Group 1
   g. Offices, including Data Processing: Light Hazard

4. Minimum Density for Automatic-Sprinkler Piping Design:
   a. Light-Hazard Occupancy: 0.10 gpm/sq. ft. over 1500 sq. ft. area.
   b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm/sq. ft. over 1500 sq. ft. area.
   c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm/sq. ft. over 1500 sq. ft. area.
5. Maximum Protection Area per Sprinkler:
   a. Office Spaces: 225 sq. ft..
   b. Storage Areas: 130 sq. ft..
   c. Mechanical Equipment Rooms: 130 sq. ft..

d. Electrical Equipment Rooms: 130 sq. ft..
e. Other Areas: In accordance with NFPA 13 recommendations unless otherwise indicated.

6. Total Combined Hose-Stream Demand Requirement: In accordance with NFPA 13 unless otherwise indicated:

a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.

F. Obtain documented approval of fire-suppression system design from AHJs.

2.3 FIRE-SUPPRESSION PIPING, FITTINGS, AND APPURTENANCES

A. Steel Pipe, Fittings, and Appurtenances:

1. Schedule 40 Steel Pipe: black-steel pipe, ASTM A53/A53M, ASTM A135/A135M, or ASTM A795/A795M.

a. Standards:

1) UL 852.
2) FM 1630.

b. Factory-applied exterior coating.
c. Factory-applied bacterial-resistant internal coating to reduce microbiologically influenced corrosion.

2. Steel Pipe Nipples: black steel, ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.
3. Steel Couplings: uncoated steel, ASTM A865/A865M, threaded.
4. Gray-Iron Threaded Fittings: uncoated gray-iron threaded fittings, ASME B16.4, Class 125, standard pattern.
5. Malleable- or Ductile-Iron Unions: ASME B16.3.
6. Cast-Iron Flanges: ASME B16.1, Class 125.
7. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

a. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick.

1) Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
2) Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.

b. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1 carbon steel unless otherwise indicated.

8. Steel Welding Fittings: ASTM A234/A234M and ASME B16.9.

a. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

9. Plain-End-Pipe Fittings:
   a. Pressure Rating: 175 psig minimum.
   b. Plain-End Fittings for Steel Piping: Painted, plain-end fittings, ASTM A53/A53M, carbon steel or ASTM A106/A106M, forged steel with dimensions matching steel pipe.
   c. Plain-End-Pipe Couplings for Steel Piping: Rigid pattern for steel-pipe dimensions, ductile-iron or malleable-iron housing. Include EPDM-rubber gasket, and bolts and nuts.

10. Grooved-Joint, Steel-Pipe Appurtenances:
    a. Pressure Rating: 175 psig minimum.
    b. Grooved-End Fittings for Steel Piping: Painted grooved-end fittings, ASTM A47/A47M, malleable-iron casting or ASTM A536, ductile-iron casting, with dimensions matching steel pipe.
    c. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

11. Carbon Steel Pressure-Seal Fittings: UL 213, FM Approvals-approved, 175 psig pressure rating with carbon steel-, zinc-nickel-coated housing, EDPM O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.

B. Copper Tube, Fittings, and Appurtenances:

1. Copper Tube, Drawn Temper: ASTM B88, Type K.
2. Solder-Joint Fittings, Cast Copper: ASME B16.18 pressure fittings.
3. Solder-Joint Fittings, Wrought Copper: ASME B16.22 pressure fittings.
4. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
5. Unions, Cast Copper: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
6. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
7. Copper Tube, Mechanically Formed Tee Fitting: For forming T-branch on copper water tube.
   a. Description: Tee formed in copper tube in accordance with ASTM F2014.

8. Grooved, Mechanical-Joint, Copper-Tube Appurtenances:
   a. Standard: UL 213.
   b. Grooved-End Copper Fittings: ASTM B75/B75M copper tube or ASTM B584 bronze castings.
   c. Grooved-End-Tube Couplings: To fit copper tube dimensions; rigid pattern unless otherwise indicated; gasketed fitting EPDM-rubber gasket rated for minimum 180 deg F for use with ferrous housing and steel bolts and nuts; 300 psig minimum CWP pressure rating.

9. Copper-Tube, Pressure-Seal-Joint Fittings:

a. Fittings: Cast brass, cast bronze, or wrought copper with EPDM O-ring seal in each end.
b. Minimum 200 psig working-pressure rating at 250 deg F.

2.4 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connection, Exposed Type:
1. Standard: UL 405.
2. Description: Exposed, projecting, for BFP mounting.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Corrosion-resistant metal.
5. Inlets: Brass with threads in accordance with NFPA 1963 and matching local fire department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
6. Caps: Brass, lugged type, with gasket and chain.
7. Outlet: Back, with pipe threads.
8. Number of Inlets: Two.
9. Escutcheon Plate Marking: "AUTO SPKR".
10. Finish: Rough brass or bronze.
11. Outlet Size: NPS 4.

2.5 SYSTEM CONTROL VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Approvals' "Approval Guide."

B. Pressure Rating:

1. Standard-Pressure Piping Valves: 175 psig minimum.
2. High-Pressure Piping Valves: 250 psig minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. System Control Valve, Alarm Valve:
1. Standard: UL 193.
2. Design: For horizontal or vertical installation.
3. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gauges, retarding chamber, and fill-line attachment with strainer.
4. Drip cup assembly pipe drain without valves and separate from main drain piping.

2.6 FIRE-SUPPRESSION PIPING SPECIALTIES

A. Branch Outlet Fittings:
1. Standard: UL 213.

2. Pressure Rating: 175 psig minimum 300 psig.
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:
1. Standard: UL's "Fire Protection Equipment Directory" or FM Approvals' "Approval Guide."
2. Pressure Rating: 175 psig minimum.
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:
1. Standard: UL 199.
2. Pressure Rating: 175 psig.
3. Body Material: Brass.
4. Size: Same as connected piping.
5. Inlet: Threaded.
6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:
1. Standard: UL's "Fire Protection Equipment Directory" or FM Approvals' "Approval Guide."
2. Pressure Rating: 175 psig minimum.
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:
1. Standard: UL 1474.
2. Pressure Rating: 250 psig minimum.
3. Body Material: Steel pipe with EPDM-rubber O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

F. Flexible Sprinkler Hose Fittings:
1. Standards:

a. UL 2443.
b. FM 1637.

2. Description: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.

3. Pressure Rating: 175 psig minimum.
4. Size: Same as connected piping, for sprinkler.

G. Automatic (Ball-Drip) Drain Valves:
1. Pressure Rating: 175 psig minimum.
2. Type: Automatic draining, ball check.
3. Size: NPS 3/4.
4. End Connections: Threaded.

H. Automatic Air Vent:
1. Description: Automatic air vent that automatically vents trapped air without human intervention. Approved for use in wet-pipe fire-suppression system.
2. Vents oxygen continuously from system.
3. Float valve to prevent water discharge.
4. Minimum Water Working Pressure Rating: 175 psig.
5. Description: Automatic air vent assembly that automatically vents trapped air without human intervention, including Y-strainer and ball valve in a pre-piped assembly. Approved for use in wet-pipe fire-suppression system.
6. Vents oxygen continuously from system.
7. Float valve to prevent water discharge.
8. Minimum Water Working Pressure Rating: 175 psig.

2.7 COVER SYSTEMS FOR SPRINKLER PIPING

A. Cover System, Fabricated Steel:
1. Description: System of support brackets and covers designed to protect sprinkler piping.
2. Brackets: Per cover manufacturer.
3. Covers: Factory-fabricated steel cover with concealed attachment clamps.

a. Stainless Steel with #4 Finish: 16 gauge.

1) Zinc-galvanized treated to accept painting but not painted.

2.8 SPRINKLERS

A. Standards:

1. UL 199.
2. UL 1767.
3. UL 1626.
4. FM 2000.
5. FM 2008.
6. FM 2030.

B. Listed in UL's "Fire Protection Equipment Directory" or FM Approvals' "Approval Guide."

C. Pressure Rating for Sprinklers:

1. Standard Automatic Sprinklers: 175 psig minimum.
2. High-Pressure Automatic Sprinklers: 250 psig minimum.

D. Sprinklers, Automatic Wet with Heat-Responsive Element:

1. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

2. Standard Spray, Standard Response:

a. Upright.
b. Pendent.
c. Recessed pendent.
d. Flat, concealed pendent.
e. Vertical sidewall.
f. Horizontal sidewall.

E. Sprinklers, Automatic Dry with Heat-Responsive Element:

1. Standard Spray, Standard Response:

a. Upright.
b. Pendent.
c. Recessed pendent.
d. Flat, concealed pendent.
e. Horizontal sidewall.

F. Sprinkler Finishes: Chrome plated.

G. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

H. Sprinkler Guards and Water Shields:
1. Standard: UL 199.
2. Description: Wire cage with fastening device for attaching to sprinkler.

2.9 ALARM DEVICES

A. Match alarm-device material and connection types to piping and equipment materials and connection types.

B. Water-Motor-Operated Alarm:
1. Standard: UL 753.

2. Type: Mechanically operated, with Pelton wheel.
3. Alarm Gong: Cast aluminum with red-enamel factory finish.
4. Size: 10-inch diameter.
5. Components: Shaft length, bearings, and sleeve to suit wall construction.
6. Inlet: NPS 3/4.
7. Outlet: NPS 1 drain connection.

C. Water-Flow Indicators:
1. Standard: UL 346.
2. Water-Flow Detector: Electrically supervised.
3. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125 V ac and 0.25 A, 24 V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
4. Type: Paddle operated.
5. Pressure Rating: 250 psig.
6. Design Installation: Horizontal or vertical.

D. Valve Supervisory Switches:
1. Standard: UL 346.
2. Type: Electrically supervised.
3. Design: Signals that controlled valve is in other than fully open position.
4. Wire Terminal Designations: Indicates normal switch position when switch is properly installed on valve and valve is fully open.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. OS&Y Valve Supervisory Switches:

    a. One or two single-pole, double-throw switches.
    b. NEMA Rating: NEMA 4 and NEMA 6P enclosures suitable for mounting in any position indoors or outdoors.
    c. Visual Switch Indication: Indicates device is properly installed and OS&Y valve is fully open.
    d. Mounting Hardware: Mounting bracket to grip valve yoke and prevent movement of switch assembly on OS&Y valve.
    e. Trip Rod Length: Adjustable

7. Butterfly Valve Supervisory Switches:

    a. Two single-pole, double-throw switches.
    b. NEMA Rating: NEMA 4 and NEMA 6P enclosures suitable for mounting in any position indoors or outdoors.
    c. Mounting Hardware: Removable nipple.
    d. Trip Rod Length: Adjustable

8. Ball Valve Supervisory Switches:

    a. One single-pole, double-throw switch.

b. NEMA Rating: NEMA 4 enclosure suitable for mounting in any position indoors or outdoors.
c. Mounting Hardware: Suitable for mounting directly to pipe, ball valves, or backflow preventers sized from up to NPS 2.

2.10 PRESSURE GAUGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch diameter.

C. Pressure Gauge Range: 0 to 300 psig.

D. Water System Piping Gauge: Include "WATER" or "AIR/WATER" label on dial face.

E. Air System Piping Gauge: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test. Use results for system design calculations required in "Quality Assurance" Article.

1. Flow test is to be performed to meet the criteria established by NFPA 13.
2. Flow test is to be conducted in accordance with NFPA 291.
3. Test is to be performed during a period of ordinary demand for the water system.

    a. To obtain satisfactory test results of expected flow or rated capacities, sufficient discharge should be achieved to cause drop of at least 10 percent.

4. Pitot readings are to be taken at the 2-1/2-inch orifice connection.
5. The pitot reading is to range from 10 to 35 psig.
6. Open additional hydrant outlets as needed to control pitot readings.
7. The pitot pressure and corresponding residual pressure readings are to be taken consecutively as pressure fluctuates between a high number and low number.

B. Flow Test Data Written Report:

1. Flow data report is to be written in accordance with NFPA 291.
2. Flow data report is to include a copy of all flow data recorded during the test, including a site plan showing the tested fire hydrants with respect to the fire water service to the building. Site plan is to indicate which hydrant was flowed and which hydrant was used for pressure reading. Provide date of test, name of testing agency, and name of individual performing test.

C. Water Supply Curve: Provide water supply curve based on the lowest supply for a given set of test data. For a given residual pressure reading, the supply is to be graphed utilizing the corresponding pitot pressure/flow reading and static pressure reading.

D. Documentation is to include calibration certifications for gauges used in the flow tests. The certifications are to be from within the previous six (6) months from a reputable agency recognized for certifying pressure gauges.

E. Report flow test results promptly and in writing. A copy of the flow test data report is to be submitted with the hydraulic calculations.

3.2 INSTALLATION OF FIRE-SUPPRESSION WATER-SERVICE PIPING

A. Comply with requirements for fire-suppression water-service piping in Section 331415 "Site Water Distribution Piping."

3.3 INSTALLATION OF DOMESTIC WATER-SUPPLY CONNECTIONS

A. Connect fire-suppression water piping to building's interior domestic water-distribution piping. Comply with requirements for interior piping in Section "Domestic Water Piping."

B. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements for backflow preventers in Section "Site Water Distribution Piping."

3.4 INSTALLATION OF FIRE-SUPPRESSION PIPING

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from AHJs. File written approval with Architect before deviating from approved working plans.
2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard: Comply with NFPA 13 requirements for installation of fire-suppression piping.

C. Install listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install unions adjacent to each valve in pipes NPS 2 and smaller.

E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

F. Install inspector's test connections in sprinkler system piping, complete with shutoff valve, and sized and located in accordance with NFPA 13.

G. Install fire-suppression system piping with drains for complete system drainage. Extend drain piping to exterior of building where possible.

H. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

I. Install automatic (ball drip) drain valve at each check valve for fire department connection, to drain piping between fire department connection and check valve. Install drain piping to and spill over floor drain or to exterior of building.

J. Install alarm devices in piping systems.

K. Install hangers and supports for fire-suppression piping in accordance with NFPA standards. Comply with requirements for hanger materials in NFPA standards. In seismic-rated areas, refer to Section "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."

L. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe/sprinkler supply. Include pressure gauges with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they are not subject to freezing.

M. Fill wet-type fire-suppression system piping with water.

N. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section "Common Work Results for Fire-Suppression Piping."

O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section "Common Work Results for Fire-Suppression Piping."

3.5 INSTALLATION OF PIPING JOINTS

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts in accordance with ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Pressure-Sealed Joints: Join steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

J. Welded Joints: Construct joints in accordance with AWS D10.12M/D10.12, using qualified processes and welding operators in accordance with "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe in accordance with AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings in accordance with AWWA C606 for steel-pipe joints.

L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe in accordance with AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings in accordance with AWWA C606 for steel-pipe grooved joints.

M. Brazed Joints: Join copper tube and fittings in accordance with Copper Development Association's "Copper Tube Handbook," "Brazed Joints" chapter.

N. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube in accordance with AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings in accordance with AWWA C606 for steel-pipe grooved joints.

O. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.

P. Extruded-Tee Connections: Form tee in copper tube in accordance with ASTM F2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

Q. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.6 INSTALLATION OF FIRE DEPARTMENT CONNECTIONS

A. Install wall-type fire department connections mounted on the backflow preventer.

B. Install automatic (ball-drip) drain valve at each check valve for fire department connection.

3.7 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

A. Install cover system, brackets, and cover components for sprinkler piping in accordance with manufacturer's installation manual and in accordance with NFPA 13 for supports.

3.8 INSTALLATION OF VALVES AND SPECIALTIES

A. Install listed fire-suppression system control valves, trim and drain valves, specialty valves and trim, controls, and specialties in accordance with manufacturer's installation instructions, NFPA standards, and AHJ.

B. Install listed fire-suppression system shutoff valves in supervised open position, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. System Control Valves:

1. Install alarm valves with bypass check valve and retarding chamber drain-line connection.

D. Air Vent:

1. Provide at least one air vent at high point in each wet-pipe fire-suppression system in accordance with NFPA standards. Connect vent into top of fire-suppression piping.
2. Provide dielectric union for dissimilar metals, ball valve, and strainer upstream of automatic air vent.

3.9 INSTALLATION OF SPRINKLERS

A. Install sprinklers in suspended ceilings symmetrically in center of acoustical ceiling panels within tolerance of 1/2 inch. Coordinate entire pattern of sprinkler locations with approved reflected ceiling plan.

B. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.10 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping in accordance with requirements for identification specified in Section "Identification for Fire-Suppression Piping and Equipment."

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section "Identification for Electrical Systems."

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Perform the following tests and inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect fire-suppression systems in accordance with NFPA standards.
4. Energize circuits to electrical equipment and devices.
5. Start and run air compressors.
6. Coordinate with fire-alarm tests. Operate as required.
7. Coordinate with fire-pump tests. Operate as required.
8. Verify that equipment hose threads are same as local fire department equipment.
9. Verify that sprinklers original factory finish has not been contaminated with dirt, debris, or paint. Sprinklers containing other-than-original factory finish are to be considered defective and replaced with new products. Repair and/or cleaning is not acceptable.

C. Fire-suppression piping system will be considered defective if it does not pass tests and inspections.

D. Fire-suppression piping system components considered defective during testing will be replaced with new components. Repair of defective components is not acceptable.

E. Prepare test and inspection reports.

3.12 CLEANING

A. Clean dirt and debris from fire-suppression system piping, system control valves, sprinklers, and associated components.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.13 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain system control valves.

3.14 PIPING SCHEDULE

A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. Copper-tube, extruded-tee connections may be used for tee branches in copper tubing instead of specified copper fittings. Branch-connection joints must be brazed.

D. Standard-Pressure, Wet-Pipe Sprinkler System to Be One of the Following:

1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

E. High-Pressure, Wet-Pipe Sprinkler System, to Be One of the Following:

1. Schedule 40, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

END OF SECTION 10000

SECTION 101000 - VISUAL DISPLAY BOARDS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A This Section includes the following:

1. Porcelain enamel marker boards.
2. Natural-cork tackboards.

1.3 SUBMITTALS

A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. For Review:

1. Product Data: For each type of visual display board indicated. Revise paragraph below to suit Project. Include only those products required.
2. Shop Drawings: for each type of visual display board required.
    a. Include dimensioned elevations. Show location of joints between individual panels where unit dimensions exceed maximum panel length.
    b. Include sections of typical trim members.
    c. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
3. Samples for Verification: Of the following products, showing color and texture or finish selected. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected. Prepare Samples from the same material to be used for the Work.
    a. Visual Display Boards: Sample panels not less than 8-1/2 by 11 inches (215 by 280 mm), mounted on the substrate indicated for the final Work. Include a panel for each type, color, and texture required.
    b. Aluminum Trim and Accessories: Samples of each finish type and color, on 6-inch (150 mm) long sections of extrusions and not less than 4-inch (100 mm) squares of sheet or plate.
4. For Closeout:
    a. Shop drawing
    b. Product data
    c. Warranty

d. Cleaning procedures for marker board surfaces.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain visual display boards through one source from a single manufacturer.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify field measurements before preparation of Shop Drawings and before fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.6 WARRANTY

A. General Warranty: The special porcelain enamel markerboard warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provision of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Porcelain Enamel Markerboard Warranty: Submit a written warranty executed by manufacturer agreeing to replace porcelain enamel markerboards that do not retain their original writing and erasing qualities, become slick and shiny, or exhibit crazing, cracking, or failing within the specified warranty period, provided the manufacturer's written instructions for handling, installation, protection, and maintenance have been followed.

1. Warranty Period: 50 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Porcelain Enamel Markerboards:
    a. Best-Rite Manufacturing Company.
    b. Claridge Products and Equipment, Inc.
    c. American Vision Display Products, LLC.
    d. Polyvision Corporation.
    e. Newline Products, Inc.
2. Tackboards:
    a. Best-Rite Manufacturing Company.
    b. Claridge Products and Equipment, Inc.
    c. American Vision Display Products, LLC.

d. Polyvision Corporation.

e. Newline Products, Inc.

2.2 MATERIALS

A. Porcelain Enamel Markerboards: Balanced, high-pressure laminated, porcelain enamel chalkboards of 3-ply construction consisting of face sheet, core material, and backing. Markerboards shall be manually operated horizontal sliding units. Units shall have a fixed rear panel, and a front, horizontally sliding panel.

1. Face Sheet: 0.024-inch (0.61 mm) enameling grade steel especially processed for temperatures used in coating porcelain on steel. Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Coat concealed face with a 2-coat process consisting of primer and ground coat. Fuse cover and ground coats to steel at manufacturer's standard firing temperatures, but not less than 1200 deg F (649 deg C).

   a. Cover Coat: Provide manufacturer's standard, light colored, special writing surface with gloss finish intended for use with erasable dry markers.

2. Core: One of the following:

   a. 3/8-inch – (9.5 mm) thick, particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.

   b. 3/8-inch – (6.4 mm) thick, tempered hardboard core material.

3. Backing Sheet; 0.015-inch (0.38 mm) thick, aluminum-sheet backing.

4. Laminate Adhesive: Manufacturer's standard, moisture-resistant, thermoplastic-type adhesive.

5. Size: Units shall be as indicated on the drawings.

B. Natural Cork Tackboards: Single layer, ¼ inch (6.4 mm) thick, seamless compressed fine-grain, bulletin board quality, natural-cork sheet; face sanded for natural finish; complying with MS MIL-C-15116, Type II.

1. Backing: Factory laminate cork face sheet under pressure to ¼ inch (6.4 mm) thick hardboard backing.

2. Size: As indicated on the drawings. If not indicated, 4 feet 0 inches by 4 feet 0 inches minimum.

2.3 ACCESSORIES

A. Metal Trim and Accessories: Fabricate frames and trim of not less than 0.062 inch (1.57 mm) thick, extruded-aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units. Keep joints to a minimum. Miter corners to neat, hairline closure.

1. Field-Applied Trim: Manufacturer's standard snap-on trim with no visible screws or exposed joints.

2. Chalk tray: Manufacturer's standard, continuous, box-type, aluminum chalk tray with slanted front and cast-aluminum end closures for each chalkboard.

3. Map Rail: Furnish map rail at top of each unit, complete with the following accessories:

   a. Display Rail: Provide continuous cork display rail approximately 1 or 2 inches (25 or 50 mm) wide, as indicated, integral with map rail.

   b. End Stops: Provide one end stop at each end of map rail.

   c. Map Hooks: Provide 2 map hooks for every 48 inches (1220 mm) of map rail or fraction thereof.

   d. Flag Holder: Provide one flag holder for each room.

2.4 FABRICATION

A. Assembly: Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.

2.5 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

C. Class II, Clear Anodic Finish: Aa-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of visual display boards.

1. Surfaces to receive markerboards shall be free of dirt, scaling paint, and projections or depressions that would affect smooth, finished surfaces of chalkboards or markerboards.

2. Surfaces to receive tackboards shall be dry and free of substances that would impair the bond between tackboards and substrate.

3. Do not proceed with installation unit unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install units in locations, at mounting heights according to SREF requirements and according to manufacturer's written instructions. Keep perimeter lines straight, plumb and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

3.3 ADJUSTING AND CLEANING

A. Verify that accessories required for each unit have been properly installed and that operating units function properly.

B. Clean units according to manufacturer's written instructions.

END OF SECTION 101000

SECTION 101600 - TOILET PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Toilet partition system, including toilet enclosures, room entrance screens, and urinal screens, shall be a complete and usable system of panels, hardware, and support components. The partition system shall be provided by a single manufacturer and shall be a standard product as shown in the most recent catalog data. The partition system shall be as shown.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Product Data: Provide manufacturer's technical data and catalog cuts including installation and cleaning instructions.

C. Shop Drawings: Drawings showing plans, elevations, details of construction, hardware, reinforcing, fittings, mountings, and anchorings.

D. Samples: Provide manufacturer’s full line of color selections for selection by Total Program Manager (TPM).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Components shall be delivered to the jobsite in the manufacturer's original packaging with the brand, item identification, and project reference clearly marked. Components shall be stored in a dry location that is adequately ventilated; free from dust, water, or other contaminants; and shall have easy access for inspection and handling.

1.5 WARRANTY

A. Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 - PRODUCTS

2.1 TOILET ENCLOSURES

A. Toilet enclosures shall conform to CID A-A-60003, Type I, Style A, floor supported. Width, length, and height of toilet enclosures shall be as shown. Finish surface of panels shall be laminated plastic.

Panels indicated to receive toilet paper holders or grab bars as specified in Section 10800 TOILET ACCESSORIES, shall be prepared for mounting of the items required. Grab bars shall withstand a bending stress, shear stress, shear force, and a tensile force induced by 250 lbf. Grab bars shall not rotate within their fittings.

B. Approved manufactures are:
1. Bradley Corporation, Mills Partitions: Bradmar Sentinel Series 400, Overhead Braced restroom Partitions.

2.2 HARDWARE

A. Hardware for the toilet partition system shall be manufacturer’s standard for the specified type and style of partitions. Hardware finish shall be highly resistant to alkalies, urine, and other common toilet room acids.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Toilet partitions shall be installed straight and plumb in accordance with approved manufacturer's instructions with horizontal lines level and rigidly anchored to the supporting construction. Where indicated, anchorage to walls shall be by toggle-bolting. Drilling and cutting for installation of anchors shall be at locations that will be concealed in the finished work.

3.2 ADJUSTING AND CLEANING

A. Doors shall have a uniform vertical edge clearance of approximately 3/16 inch and shall rest open at approximately 30 degrees when unlatched. Toilet partitions shall be cleaned in accordance with approved manufacturer's instructions and shall be protected from damage until accepted.

END OF SECTION 101600

SECTION 102010 - LOUVERS (Colored Anodized Aluminum)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fixed, extruded aluminum louvers
2. Accessories

B. Related sections include the following:

1. Division 8 Section “Flush Wood Doors” for installation of louvers in wood doors where scheduled on the drawings.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section, unless otherwise defined in this Section or in referenced standards.

B. Standard Free Area: Free area of a louver 48 inches (1220 mm) wide by 48 inches (1220 mm) high, identical to that provided.

1.4 PERFORMANCE REQUIREMENTS

A. Air Performance, Water Penetration, and Air Leakage Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer’s stock units 48 inches (1220 mm) wide by 48 inches (1220 mm) high. Test units according to AMCA 500-D-2007.

1. Perform testing on unpainted, cleaned, degreased units.
2. Air Flow: Maximum 850 fpm through louver free area.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. For Review:

1. Product Data for each type of product specified.
2. Shop Drawings: For louver units and accessories. Include plans; elevations; sections; and details showing profiles, angles and spacing of louver blades. Show unit dimensions related to door openings and construction; free area for each size indicated; profiles of frames at jambs, heads, and sills; and anchorage details and locations.

C. For Information Only:

1. Product Certificates: Signed by manufacturers of louvers certifying that the products furnished comply with requirements and are licensed to bear the AMCA seal based on tests made according to AMCA 500-D-2007 and complying with AMCA's Certified Ratings Program.

D. For Closeout:

1. Product Data
2. Shop Drawings

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers through one source from a single manufacturer where alike in one or more respects regarding type, design, or factory-applied colored finish.

B. Welding Standards:

1. Comply with AWS D1.2, "Structural Welding Code – Aluminum."
2. Certify that each welder had satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

C. SMACNA Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" recommendations for fabrication, construction details, and installation procedures.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify louver openings by field measurements before fabrication and indicated measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Maufacturers: Subject to compliance with requirements, provide products by one of the followings:

1. Nystrom, Inc.; Nystrom Building Products.
2. Airolite Company, LLC.
3. American Warming and Ventilating; a Division of Mestek, Inc.
4. Anemostat Door Products; a Mestek Company.
5. Cesco Products; a Division of Mestek, Inc.
6. Construction Specialties, Inc.
7. Industrial Louvers, Inc.

8. Ruskin Company, of Tomkins Building Products.

2.2 MATERIALS

A. Aluminum Extrusions: ASTM B 221-08, alloy 6063-T5 or T-52.

B. Aluminum Sheet: ASTM B 209-07, alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Of some basic metal and alloy as fastened metal or 300 seriers stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined metals.

D. Anchors and Inserts: Of type, size, and material required for loading and installation indicated.

2.3 FABRICATION, GENERAL

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitation. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in opening of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining materials' tolerances, and perimeter sealant joints.

D. Include supports, anchorages, and accessories for complete assembly.

2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Louver Construction: Provide fixed-blade louvers with extruded-aluminum frames and blades.

B. Horizontal, Fixed-Blade Louvers For Doors: As follows:

1. Louver Depth: 2-1/8 inches (overall)
2. Frame Thickness: 0.081 inch (2.06 mm)
3. Blade Thickness: 0.081 inch (2.06 mm)
4. Blade Type: Inverted “V”, 1” width, with 1/2” space between blades.

2.5 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.

B. Architectural Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.

1. Color: As selected by TPM from manufacturers standard colors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate Setting Drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be installed ininterior wood doors. Coordinate delivery of such items to Project site.

3.2 INSTALLATION

A. Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

B. Form closely fitted joints with exposed connections accurately located and secured.

C. Repair finishes damaged by cutting, welding, soldering and grinding. Restore finishes so no evidence remains of corrective work. Return items that canot be refinished iin the field to the factory, make required alterations, and refinish entire unit or provide new units.

3.3 CLEANING, AND PROTECTING

A. Protect louvers from damage during construction. Use temporary protective covering where needed and approved by louver manufacturer. Remove protective covering at the time of Substantial Completion.

B. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and provide with new units.

1. Clean and touch up minor abrasions with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 10201

SECTION 102600 - WALL CORNER GUARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this section.

1.2 SUMMARY

A. This section includes:
   1. Surface mounted integrally colored resilient corner guards.

1.3 QUALITY ASSURANCE

A. Standards: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall be the most current issue.

ALUMINUM ASSOCIATION (AA)

AA 45 Aluminum Finishes

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

ASTM B 221 Aluminum and Aluminum-Alloy Extruded Bars, Rods,Wire, Profiles, and Tubes

ASTM D 256 Determining the Pendulum Impact Resistance of Plastics

ASTM E 84 Surface Burning Characteristics of Building Materials

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURES (NAAMM)

NAMM MFM Metal Finishes Manual

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE J 1545 Instrumental Color Difference Measurement for Exterior Finishes, Textiles and Colored Trim

1.4 SUBMITTALS

A. The following shall be submitted in accordance with section 01330 Sumbittals:
   1. Manufacture's catalog Data:
      a. Surface-mounted integrally colored corner guards.
   2. Instructions: Include standard installation detail drawings where applicable.

1.5 DELIVERY AND STORAGE

A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer. Protect from damage from handling and construction operations before, during, and after installation. Store materials for door and door frame protection in a dry environment of approximately 20 degrees C (70 degrees F) for at least 48 hours prior to installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 167, Type 302 or 304, with No. 4 finish.

B. Aluminum Extruded: ASTM B 221, Alloy 6063, Temper T5 or T6.

C. Resilient Material: Extruded and injection molded acrylic vinyl or extruded polyvinyl chloride meeting following requirements.
   1. Minimum Impact Resistance: ASTM D 256, 960 J per m (18 foot/pounds (Izod impact, foot/pounds per inch notch)).
   2. Class 1 Fire Rating: ASTM E 84, maximum flame spread rating of 25 and a smoke developed rating of 450 or less.
   3. Integral Color: Integral color with all colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.
   4. Finish: Finish for resilient material shall be embossed stipple texture with colors in accordance with SAE J 1545.

2.2 CORNER GUARDS

A. Resilient, Shock-Absorbing Corner Guards: Surface mounted type of 1/4 inch radiused corner.
   1. Assembly: Assembly shall consist of a snap-on corner guard formed from resilient material, minimum 2 mm (0.078 inch) thick, free floating on a continuous 1.6 mm (0.063 inch) thick extruded aluminum retainer. Provide appropriate mounting hardware, cushions and base plates as required.
   2. End Closure Caps: Provide factory fabricated end closure caps at top and bottom of surface mounted corner guards.
   3. Corner Guards shall have 2” legs, and shall be 8’ lengths.

2.3 FASTENERS AND ANCHORS

A. Provide fasteners and anchors as required for each specific type of installation.

2.4 FINISH

A. Aluminum: AA 45, finish numbers for aluminum.
   1. Concealed Aluminum: Mill finish as fabricated, uniform in natural color and free from surface blemishes.

B. Stainless Steel: NAAMM MFM, Mechanical finish number 4.

C. Resilient Material: Embossed texture and color in accordance with SAE J 1545 and as otherwise specified.

PART 3 - EXECUTION

3.1 RESILIENT CORNER GUARDS

Install resilient corner guards on walls in accordance with manufacturer's printed details and instructions.

3.2 SCHEDULE

Products	English Units
Snap-On Covers	0.078 inch
Aluminum Retainers	0.063 inch
Stainless Steel	0.0625 inch
Retainer Clips	2 x 0.090 inches
Wall Guards	0.0250 inch
Brackets	0.20 inch
Protection Material	0.060 inch

END OF SECTION 102600

SECTION 103500 - FLAG POLE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including the General and Supplementary conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes:

1. Aluminum flagpoles.
2. Accessories.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200 - Earthwork: For excavation, backfill, and material for installation requirements.

B. Section 03001-Concrete: For concrete materials and concrete installation requirements.

1.4 REFERENCES

A. AA - Aluminum Association.

B. ASTM B 241/B 241M-02 - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

C. ASTM B 917/ B 917M-08 Standard Practice for Heat Treatment of Aluminum-Alloy Castings from All Processes.

D. ASTM B 918-01 Standard Practice for Heat Treatment of Wrought Aluminum Alloys.

E. ASTM C 33-07 - Standard Specification for Concrete Aggregates.

F. NAAMM FP 1001-07 Manual: Guide Specifications for Design of Metal Flagpoles.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings:
1. Structural Calculations: Include structural analysis data signed and sealed by a state of Florida professional engineer.
2. Include details of foundation system.
3. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:
1. Five years experience installing flagpoles of similar height and complexity in locale of project.
2. Authorized and trained by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Keep flagpole and accessories covered to prevent soiling or damage.

1.8 PROJECT CONDITIONS

A. Structural Performance: Provide flagpole assemblies, including anchorages and supports, capable of withstanding the effects of wind loads, determined according to NAAMM FP 1001-07 for specified ground speed.

1.9 WARRANTY

A. Warranty: Materials covered by this section shall carry a three (3) year warranty from date of acceptance. Warranty shall include responsibility for removing and replacing other work as necessary to accomplish repairs or replacement of materials covered by warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. The Flagpole Warehouse, a Division of The Flag Company, Inc.
3600 Cantrell Industrial Ct., Acworth, GA 30101.
(800) 962-0956. Fax 770-974-4560. Web: www.flagpolewarehouse.com.

2. Concord Industries, Inc.; 4150-A Kellway Circle, Dallas TX 75001. P.O. Box 2449 Addison, TX 75001 (800) 527-3902 Fax: 800-426-5770. Web: www.concordindustries.com.

3. American Flagpoles and Flags; 3183 Highway 17 North, Suite 202 Mount Pleasant, SC 29466. Web: www. americanflags.net. (843) 797-1744, (800) 777-1706; Fax: (843) 572-3100

4. Kronberg's Flags and Flagpoles; 7106 Mapleridge Drive, Houston, TX 77081. (800) 344-3524. Web: www.kronbergsflagsandflagpoles.com.

5. Morgan-Francis Flagpoles; 9850 East 30th Street, Indianapolis, IN 46229. (800) 814-9568. Web: www.morgan-francis.com.

2.2 FLAG POLE

A. Hurricane Series (The Flagpole Warehouse):

1. External rope halyard. Manually operated halyard. Ball-bearing, nonfouling, revolving truck assembly. Finish exposed metal surfaces to match flagpole. Height (above ground)/Unflagged Wind Speed: 40 feet (12 m)/ 150 mph (241 kph). Butt diameter shall be 8 inches. Top of pole shall be 3.5 inches.

2.3 MATERIALS

A. Pole: Aluminum tubing with uniform conical taper fabricated from seamless extruded tubing complying with ASTM B 241-02. Heat treated and age hardened after fabrication to comply with ASTM B 917/B 917M-08 - Temper T6. aluminum shall have a minimum tensile strength of 30,000 psi, and a yield point of 25,000 psi.

2.3 ACCESSORIES

A. Flagpole collar. Provide manufacturer's standard spun aluminum collar finished to match flag pole. Collar shall be 13 inches in diameter (1 inch greater than diameter of ground sleeve).

B. Foundation tube. Provide manufacturer's 12 inch diameter flag pole foundation tube, fabricated from 16 gauge galvanized steel, with a steel base plate 12 inches square, minimum. A 6 inch square setting plate shall be securely welded to the ground spike at least 6 inches below the base plate. The ground spike shall be 3/4" diameter by 18 inches long, minimum.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until final grades and elevations have been established.

B. If final base elevation is determined by others, confirm with Architect before proceeding.

3.2 INSTALLATION

A. Ground Sleeve Installation: Install ground sleeve with ground spike, setting plate, and base plate per flag pole manufacturer's recommendations. Ground sleeve shall be encased in concrete foundation, 4'-6" deep, 36" diameter at the bottom, and 42" diameter at the top, minimum. Top of concrete foundation shall be sloped to provide positive drainage away from the flag pole. Flag pole shall be installed in ground sleeve using manufacturer's recommended wedges, sand and sealant. Sealant shall be installed around flag pole between pole and ground sleeve, beneath the collar.

B. Install in accordance with manufacturer's instructions.

1. Flagpole shall be plumb.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products prior to Substantial Completion

END OF SECTION 10350

SECTION 104250 - SIGNS, INTERIOR

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract include General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

1.2 SUMARY

A. This Section includes the following types of signs:

1. Panel signs.

1.3 SUBMITTALS

A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. For Review:

1 Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

2 Provide message list for each sign required, including large-scale details of wording and lettering layout.

3 Samples for verification of color, pattern, texture selected and compliance with requirements indicated:

1.4 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Manufacturers of Panel Signs:

a) ASI Sign Systems, Inc. dba ASI-Modulex.

b) Best Sign Systems, Inc.

c) Mohawk Sign Systems, Inc.

d) Seton Identification Products, A Tricor Direct Company.

e) The Supersine Company; Division of Stamp-Rite, Inc.

f) 3M Company: 3M Graphics Market Center.

g) Bayuk Graphic Systems, Inc.

h) MULTI-graphics, Incorporated.

2.2 MATERIALS

A. Sign Material: One of the following:

1. Plastic Laminate: Provide high-pressure plastic laminate engraving stock with face and core plies in contrasting colors, in finishes and color combinations indicated, or not indicated, as selected from the manufacturer's standards.
2. ABS plastic: Provide high-impact thermoplastic composed of copolymers of acrylonitrile, butadiene, and styrene.

2.3 PANEL SIGNS

A. Sign Fabrication

1. Thickness: 1/8 inch.
2. Edge conditions: Beveled cut.
3. Edge Color for Plastic Laminate: Edge color same as background.
4. Corner Condition: Corners rounded to radius indicated.
5. Colors: As selected by the TPM. (match existing campus signage).

B. Laminated Sign Panels: Permanently laminate face panels to backing sheets of material and thickness indicated using the manufacturer's standard process.

C. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style spacing, content, position, material, finishes, and colors of letters, numbers and other graphic devices.

D. Raised Copy: Letters, numbers, symbols, and other graphic devices shall be the result of sand-blasting, or equivalent process, of the background material that results in characters raised 1/32 inch above, and integral with, the background material. In addition to the 1/32" height, the copy shall have a minimum stroke width of ¼". The panel material shall be matte-finished. All Braille shall be grade 1, raised not less than 1/32"

1. Engrave the copy to produce a minimum indentation depth of 1/32 inch and a minimum stroke width of ¼ inch.

E. International symbol of accessibility included where required and appropriate.

F. Signs and Sign Installation: Comply with Paragraph 4.30 of the Americans with Disabilities Act (ADA).

G. Signs that designate permanent rooms and spaces and signs that provide direction to or information about functional spaces shall comply with the Americans with Disabilities Act.

1. Owner will supply room names and numbers.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using one of the methods indicated below:

1. Vandal resistant screws.

2. All signs shall be mounted with Vandal resistant fasteners.

C. Locate signs and accessories where indicated by Owner. In general, locate on lock side of doors.

D. Mount signs in accordance with ADA and Florida Building Code standards. Mount signs at 60 inches AFF according to Florida Building Code.

3.2 CLEANING AND PROTECTION

A. After installation, clean and soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

3.3 SCHEDULE

A. Doors shall have a sign including room name and number according to school district standard sign type as detailed.

B. See attached Sign Schedule and mounting details.

END OF SECTION 10425

SECTION 104260 - SIGNS, EXTERIOR

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this Section.

1.2 SUMMARY

A. This Section includes:

1. Panel signs.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. For Review

1. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
2. Provide message list for each sign required, including large-scale details of wording and lettering layout.
3. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

1.4 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Manufacturers of Panel Signs:

a. ASI Sign Systems, Inc. dba ASI-Modulex.

b. Best Sign Systems, Inc.

c. Mohawk Sign Systems, Inc.

d. Seton Identification Products, A Tricor Direct Company.

e. The Supersine Company; Division of Stamp-Rite, Inc.

f. 3M Company: 3M Graphics Market Center.

g. Bayuk Graphic Systems, Inc.

h. MULTI-graphics Incorporated.

2.2 MATERIALS

A. Sign Material: Provide the following:

1. Sign 1: Provide LED backlit channel type lettering for individual letter mounting. Font: Optima Medium, Height: 12”, Wording: “DESTIN ELEMENTARY”, ALL CAPS.

2. Sign 2: Provide individual letter surface mounted. Font: OPTIMA MEDIUM, Height: 6”, Wording: “ADMINISTRATION”, ALL CAPS.

B. Stainless Steel – 304 Alloy

2.3 FINISHES

A. Fabricated Stainless Steel

1. Painted baked enamel finish. Select from manufacturer’s standard colors or specify PMS color match. Finish for paint is semi-gloss.

2.4 DEPTH

A. 2” +/- depending on manufacturer standards for sign type.

2.5 FONT STYLES

A. Optima Medium

2.6 MOUNTING HARDWARE

A. Shadow Free Stud Mount

B. Removeable Lexan Back Mount

2.7 FABRICATION

A. Letters shall be fabricated of stainless steel. Form letters by heliarc welding process. Characters should have smooth flat faces, sharp corners, precisely formed lines and profiles, free from pits, scale, and other defects.

B. Letter shall be Optima Medium letter style and shall be 12 inches high for sign type 1 and 6” for sign type 2.

C Finish shall be Painted Baked Enamel.

PART 3 – EXECUTION

3.1 INSTALLATION

A. A qualified installer shall install cut metal letters.

B. Install signs level, plumb, and at the height indicated with sign surfaces free form distortion or other defects in appearance.

3.2 WARRANTY

A. Letters should be guaranteed for 20 years against defects.

END OF SECTION 10426

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Sections:

1. Section 104416 "Fire Extinguishers."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Samples for Initial Selection: For each type of fire protection cabinet indicated.

1.3 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire hoses, hose valves, and hose racks indicated are accommodated.

C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209.
2. Extruded Shapes: ASTM B 221.

C. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet).

D. Acrylic Bubble: One piece.

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Larsen's Manufacturing Company; Architect series, horizontal duo, clear acrylic door.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Semi-Recessed: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated. Equal to Larsen’s B2409-6R. Recesses into wall approximately3.5”.

E. Cabinet Trim Material: Steel sheet.

F. Door Material: Brass.

G. Door Style: Full Metal Door.

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

I. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.

a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."

J. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:

a. Exterior of cabinet door, and trim except for those surfaces indicated to receive another finish.
b. Interior of cabinet and door.

2. Baked enamel or powder coat.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed and semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated.

1. Fire Protection Cabinets: 54 inches above finished floor to top of cabinet.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
2. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.

C. Identification: Apply vinyl lettering at locations as required.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Sections:

1. Section 104413 "Fire Extinguisher Cabinets."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.4 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
b. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
c. Larsen's Manufacturing Company.

C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:80-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings Larsen’s standard bracket No.546 or comparable product by one of the following:

a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
b. Larsen's Manufacturing Company.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

SECTION 105200 - FIRE-PROTECTION SPECIALTIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fire extinguisher cabinets

2. Bracket-mounted fire extinguishers

1.3 SUBMITTALS

A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. For Review:

1. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.

2. Fire Extinguishers: Include rating and classification.

C. For Closeout:

1. Product data

2. Maintenance instructions for Owners Personnel covering:

   a. Operation of extinguishers.

   b. Frequency of inspection and maintenance.

   c. Procedures for inspection and maintenance.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, “Standard for Portable Fire Extinguishers.”

C. Fire Extinguishers: Listed and labeled for type, rating and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide extinguishers listed and labeled by FM.

1.5 COORDINATION

A. Coordinate size of cabinets to ensure that type and capacity of fire extinguishers indicated can be accommodated.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Portable Fire Extinguishers

   a. Ansul Incorporated

   b. J.L. Industries, Inc.

   c. Kidde Fire Protection, A UTC Fire and Security Company.

   d. Larsen's Manufacturing Company.

   e. Modern Metal Products; Division of Technico, Inc.

   f. Potter Roemer; Division of Acorn Engineering Company.

2.2 FIRE EXTINGUISHER CABINETS

A. General:

1. Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated. Provide fire-rated fire extinguisher cabinets if cabinets are to be installed in fire-rated walls.

2. Cabinet size intended to contain one (1) Class ABA 10 lbs. 4A:60B: C: Fire Extinguisher.

B. Materials: Fabrication: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.

C. Cabinet Type:

1. FEC - Suitable for semi-recessed mounting, full glass "Cameo Series by Larson's or equivalent.

D. Trim Style: Fabricate trim in one piece with 2 ½" rolled edge, welded and ground smooth.

E. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.

1. Door and Trim - Steel with Powder Coat Paint Finish

F. Door Style: Manufacturer's standard design as indicated below and on drawing.

1. Acrylic Bubble - Clear with no letters.

G. Door Hardware: Provide manufacturer's standard door operating hardware of proper type for cabinet type, trim style, and door. Provide door pull, and friction latch. Provide continuous type hinge permitting door to open 180 degrees.

2.3 BRACKET MOUNTED EXTINGUISHERS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with baked-enamel finish.

1. Provide brackets for extinguishers not located in cabinets. Bracket-mounted extinguishers shall be provided in all mechanical and electrical rooms.

B. Provide one (1) Ten Pound Class ABC, A:10-B:C for each bracket location.

C. Identification: Lettering complying with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to wall surface.

2.4 FINISHING

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.

B. Painted Finishes: Clean surfaces of dirt, grease, and loose rust or mill scale. Apply finish to all surfaces of fabricated and assembled units, whether exposed or concealed when installed, except those surfaces specified to receive another finish.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Fasten mounting brackets to structure and cabinets, square and plumb.

END OF SECTION 105200

SECTION 105230 - GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Two-piece ball valves with indicators.
2. Bronze butterfly valves with indicators.
3. Iron butterfly valves with indicators.
4. Check valves.
5. Bronze OS&Y gate valves.
6. Iron OS&Y gate valves.
7. NRS gate valves.
8. Indicator posts.
9. Trim and drain valves.

1.2 DEFINITIONS

A. NRS: Nonrising stem.

B. OS&Y: Outside screw and yoke.

C. SBR: Styrene-butadiene rubber.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and weld ends.
3. Set valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

D. Protect flanges and specialties from moisture and dirt.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. UL Listed: Valves shall be listed in UL's "Online Certifications Directory" under the headings listed below and shall bear UL mark:

1. Fire Main Equipment: HAMV - Main Level.

    a. Indicator Posts, Gate Valve: HCBZ - Level 1.
    b. Ball Valves, System Control: HLUG - Level 3.
    c. Butterfly Valves: HLXS - Level 3.
    d. Check Valves: HMER - Level 3.
    e. Gate Valves: HMRZ - Level 3.

2. Sprinkler System and Water Spray System Devices: VDGT - Main Level.

    a. Valves, Trim and Drain: VQGU - Level 1.

B. FM Global Approved: Valves shall be listed in its "Approval Guide," under the headings listed below:

1. Automated Sprinkler Systems:

    a. Indicator posts.
    b. Valves.

        1) Gate valves.
        2) Check valves.
        3) Miscellaneous valves.

C. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B31.9 for building services piping valves.

D. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

E. NFPA Compliance for Valves:

1. Comply with NFPA 13, NFPA 14, NFPA 20, and NFPA 24.

F. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher, as required by system pressures.

G. Valve Sizes: Same as upstream piping unless otherwise indicated.

H. Valve Actuator Types:

1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
2. Handwheel: For other than quarter-turn trim and drain valves.
3. Handlever: For quarter-turn trim and drain valves NPS 2 and smaller.

2.3 TWO-PIECE BALL VALVES WITH INDICATORS

A.

B. Description:

1. UL 1091, except with ball instead of disc and FM Global approved for indicating valves (butterfly or ball type), Class Number 1112.
2. Minimum Pressure Rating: 175 psig.
3. Body Design: Two piece.
4. Body Material: Forged brass or bronze.
5. Port Size: Full or standard.
6. Seats: PTFE.
7. Stem: Bronze or stainless steel.
8. Ball: Chrome-plated brass.
9. Actuator: Worm gear
10. Supervisory Switch: Internal or external.
11. End Connections for Valves NPS 1 through NPS 2: Threaded ends.
12. End Connections for Valves NPS 2-1/2: Grooved ends.

2.4 BRONZE BUTTERFLY VALVES WITH INDICATORS

A. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 1112.
2. Minimum: Pressure rating: 175 psig.

3. Body Material: Bronze.
4. Seat Material: EPDM.
5. Stem Material: Bronze or stainless steel.
6. Disc: Bronze].
7. Actuator: Worm gear.
8. Supervisory Switch: Internal or external.
9. Ends Connections for Valves NPS 1 through NPS 2: Threaded ends.
10. Ends Connections for Valves NPS 2-1/2: Grooved ends.

2.5 IRON BUTTERFLY VALVES WITH INDICATORS

A. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 112.
2. Minimum Pressure Rating: 175 psig.
3. Body Material: Cast or ductile iron.
4. Seat Material: EPDM.
5. Stem: Stainless steel.
6. Disc: Ductile iron.
7. Actuator: Worm gear.
8. Supervisory Switch: Internal or external.
9. Body Design: Lug or wafer.

2.6 CHECK VALVES

A. Description:

1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 175 psig.
3. Type: Single swing check.
4. Body Material: Cast iron, ductile iron, or bronze.
5. Clapper: Bronze, ductile iron, or stainless steel.
6. Clapper Seat: Brass, bronze, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged, grooved, or threaded.

2.7 BRONZE OS&Y GATE VALVES

A. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).

2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Bronze or brass.
4. Wedge: One-piece bronze or brass.
5. Wedge Seat: Bronze.
6. Stem: Bronze or brass.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.8 IRON OS&Y GATE VALVES

A. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron, or bronze.
5. Wedge Seat: Cast or ductile iron, or bronze.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.9 NRS GATE VALVES

A. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron.
5. Wedge Seat: Cast or ductile iron, or bronze.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.10 TRIM AND DRAIN VALVES

A. Ball Valves:

1.
2. Description:

a. Pressure Rating: 175 psig.
b. Body Design: Two piece.
c. Body Material: Forged brass or bronze.
d. Port size: Full or standard.
e. Seats: PTFE.
f. Stem: Bronze or stainless steel.
g. Ball: Chrome-plated brass.
h. Actuator: Handlever.
i. End Connections for Valves NPS 1 through NPS 2-1/2: Threaded ends.
j. End Connections for Valves NPS 1-1/4 and NPS 2-1/2: Grooved ends.

B. Angle Valves:
1. Description:

a. Pressure Rating: 175 psig.
b. Body Material: Brass or bronze.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:
1. Description:

a. Pressure Rating: 175 psig.
b. Body Material: Bronze with integral seat and screw-in bonnet.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc Holder and Nut: Bronze.
f. Disc Seat: Nitrile.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 INSTALLATION, GENERAL

A. Comply with requirements in the following Sections for specific valve-installation requirements and applications:

1. Section "Water-Based Fire-Suppression Systems" for application of valves in fire-suppression standpipes; wet-pipe, fire-suppression sprinkler systems; and dry-pipe, fire-suppression sprinkler systems.
2. Section "Foam-Water Systems" for application of valves in AFFF piping.
3. Section "Site Water Distribution Piping" for application of valves in fire-suppression water-service piping.

B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply, except from fire-department connections. Install permanent identification signs, indicating portion of system controlled by each valve.

C. Install double-check valve assembly in each fire-protection water-supply connection.

D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the pipe center.

F. Install valves in position to allow full stem movement.

G. Install valve tags. Comply with requirements in Section "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

END OF SECTION 10523

SECTION 105290 - HANGERS AND SUPPORTS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal hanger-shield inserts.
5. Fastener systems.
6. Equipment supports.

B. Related Requirements:

1. Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section "Expansion Fittings and Loops for Fire-Suppression Piping" for pipe guides and anchors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for fire-suppression piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

B. NFPA Compliance: Comply with NFPA 13.

C. UL Compliance: Comply with UL 203.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: Factory-fabricated components, NFPA approved, UL listed, or FM approved for fire-suppression piping support.
2. Galvanized Metallic Coatings: Pregalvanized or hot-dip galvanized.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Copper Pipe and Tube Hangers:

1. Description: Copper-coated-steel, factory-fabricated components, NFPA approved, UL listed, or FM approved for fire-suppression piping support.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with NFPA-approved, UL-listed, or FM-approved carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:
   1. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
   2. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
   3. Channels: Continuous slotted carbon-steel channel with inturned lips.
   4. Channel Width: Selected for applicable load criteria.
   5. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
   6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Non-MFMA Manufacturer Metal Framing Systems:
   1. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
   2. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
   3. Channels: Continuous slotted [carbon-steel] <Insert material> channel with inturned lips.
   4. Channel Width: Select for applicable load criteria.
   5. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
   6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.5 THERMAL HANGER-SHIELD INSERTS

A. Insulation-Insert Material: Water-repellent-treated, ASTM C533, Type I calcium silicate with 100-psiminimum compressive strength.

B. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

C. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

D. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: NFPA-approved, UL-listed, or FM-approved threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: NFPA-approved, UL-listed, or FM-approved, insert-wedge-type anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Indoor Applications: Stainless steel.
   2. Outdoor Applications: Stainless steel.

2.7 EQUIPMENT SUPPORTS

A. Description: NFPA-approved, UL-listed, or FM-approved, welded, shop- or field-fabricated equipment support, made from structural-carbon-steel shapes.

2.8 MATERIALS

A. Aluminum: ASTM B221.

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout, suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Metal Pipe-Hanger Installation: Comply with installation requirements of approvals and listings. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.

2. Field fabricate from ASTM A36/A36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal strut systems.

D. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Install in accordance with approvals and listings.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Install in accordance with approvals and listings.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

a. MSS SP-58, Type 39 Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

a. MSS SP-58, Type 40 Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
b. NPS 4: 12 inches long and 0.06 inch thick.
c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.3 INSTALLATION OF EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment, and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touchup:

1. Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with NFPA requirements for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

F. Use thermal hanger-shield inserts for insulated piping and tubing.

G. Horizontal-Piping Hangers and Supports: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Steel Pipe Clamps (MSS Type 4): For suspension of NPS 1/2 to NPS 24 if little or no insulation is required.
3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
4. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
7. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
8. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
9. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

H. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

I. Hanger-Rod Attachments: Comply with NFPA requirements.

J. Building Attachments: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. C-Clamps (MSS Type 23): For structural shapes.
3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

K. Saddles and Shields: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal Hanger-Shield Inserts: For supporting insulated pipe.

L. Comply with NFPA requirements for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 10529

SECTION 105300 - ALUMINUM WALKWAY CANOPY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Aluminum walkway canopy

1.3 SUBMITTALS

A. Submit following in accordance with the Conditions of the Contract and Division 1 Sections.

B. For Review:

1. Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories. Include the Florida Product Approval Number for the walkway canopy system as required.

2. Shop Drawings: Submit complete shop drawings including necessary plan dimensions, elevations, and details. Verify dimensions and provide elevations at each column, finish floor and related soffit before releasing to manufacturer for fabrication. Shop drawings shall bear signature and seal of a Professional Engineer registered in state of Florida.

C. For information:

1. Certification: Submit design calculations signed and sealed by Professional Engineer registered in state that project is located, stating walkway system as designed complies with wind requirements of ASCE 7-05 "Minimum Design Loads for Buildings and Other Structures" stability criteria and to applicable Code requirements in the Florida State Department of Education's "State Requirements for Educational Facilities" (SREF 2007), Chapter 4, Section 423 of the Florida Building Code, and other governing criteria, including a wind speed of 140 MPH.

1.4 SYSTEM DESCRIPTION

A. Aluminum Walkway Canopy: An all-extruded structural system of aluminum rigid bents and long span decking, minimum thickness 0.050". Provide radiused beams and fascia, and segmented decking for those portions of canopy system to be constructed on radiused sidewalk.

B. Walkway Canopy Drainage: From deck to gutter and downspout through posts. All accessories shall be aluminum. All components of the walkway canopy system shall be products of a single manufacturer.

C. Walkway Canopy: An all heliarc welded extruded aluminum system complete with internal drainage. Bolted connections are not acceptable unless they provide compatible connection materials which will not rust, corrode or cause electrolysis.

D. Expansion Joints:

1. To accommodate temperature changes of 120 deg. F.
2. Not have metal-to-metal contact.
3. Manufacture responsible for quantity and location.

E. Canopy Types

1. Standard Canopy

a. Provide standard flat canopy structures at all locations other than noted below. Note: Provide modified standard canopy design as required at areas receiving stormwater from adjacent roof areas.

2. Custom Suspended Cantilever Canopy

a. Provide suspended cantilever canopy design at south side of classroom wing adjacent to driveway and parking. See detail on Sheet A-512.

1.5 QUALITY ASSURANCE

A. Design fabrication and erection of walkway covers shall be in accordance with the following publication:

1. Aluminum Association: Specifications for Aluminum Structures 5th edition, 1986.

B. Walkway Canopy: Wholly produced by a recognized manufacturer experienced in design and fabrication of extruded aluminum walkway canopy systems.

C. Components: Assembled in the shop to greatest extent possible to minimize field assembly.

D. Walkway Canopy: Installation by experienced manufacturer's representative in installation of canopy systems.

E. Configuration of walkway shall meet SREF 2007 design criteria and the Florida Building Code 2007.

F. Design structure to withstand walking on top and winds in accordance with SREF 2007 wind load provision and wind load design requirements outlined in the Florida Building Code 2007.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements provide walkway canopy by following:

1. Royal Aluminum; Product – Superpan.
2. Approved equivalent.

B. Walkway canopy system, equal or exceeding performance and requirements of specified system above by one of the following manufacturers may be accepted:

1. Canopy Systems by Mason Corporation.
2. Peachtree Protective Covers.
3. Perfection Architectural Systems, Inc.
4. Superior Metal Products Company, Inc.
5. Dittmer Architectural Aluminum.
6. Tennessee Valley Metals, Inc.
7. E.L. Burns Company, Inc.
8. American Walkway Covers, LLC.

   100 Barrett Industrial Boulevard

   Wetumpka, Alabama 36092

   Phone: (866) 583-4268

   Fax: (334) 514-4855
9. Avadek, Inc.: Avadek Walkway Cover Systems & Canopies.
10. Lawrence Commercial Systems.
11. Approved equivalent.

2.2 MATERIALS

A. Aluminum Extrusions: 6063 alloy, heat-treated to a T-6 temper.

B. Fasteners and Hardware:

1. Less than ¼" diameter nominal size: Hot dipped galvanized to withstand 200 hours salt spray test for maximum resistance to rust and corrosion.
2. ¼" diameter and larger: Stainless Steel

2.3 ROOF DECK

A. Properly support load bearing roof deck by primary framing members. Design roof deck to meet required design loads. Provide segmented deck panels where required for radiused canopy sections.

B. Fascia Gutter (Gutter Beam):

1. Fascia Gutter: An extruded aluminum open gutter system. Provide enlarged fascia and gutter as required for canopy areas receiving storm water from adjacent roof areas.
2. Corners: Shop fabricated with welded miter joint.
3. Gutter Splices: Fastened at each end and coated with manufacturer's recommend high-grade sealant.
4. Coat exposed portions of fasteners within gutter with sealant.
5. End caps: Designed in a manner to prevent leakage at seams.
6. Provide radiused fascia gutter sections where required for radiused canopy sections.

C. Electrical conduit for wiring.

2.4 DRAINAGE POSTS

A. Posts: Minimum 4" x 4" x .125 (minimum) extruded aluminum or greater to meet required design loads with welded gutter anchor plates and fasteners.

B. Provide 6" x 6" aluminum posts (minimum) at suspended cantilever canopy areas.

C. Provide opening for downspout so as not to interfere with pedestrian traffic.

2.5 GUTTER DRAINAGE BEAMS

A. Gutter Beams: Extruded aluminum tubes 4" x 4" x .125 (minimum) or greater to meet required design loads. Provide enlarged gutter beams as required for canopy areas receiving storm water from adjacent roof areas.

2.6 FINISH

A. Standard Canopy Areas – Canopy finish shall be powder coat 2604, 3 mil thickness. Color to be selected from manufacturers standard colors.

B. Custom Suspended Canopy Areas – Canopy finish shall be Class 2 clear anodic finish AA-M12C22A31 (0.4 mils to 0.7 mils thick) comply with AAMA 611.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify and approve dimensions and elevations shown on shop drawings prior for releasing to manufacturer for fabrication.

B. Examine substrates and conditions under which products of this section are to be installed and verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions.

C. In event discrepancies are discovered, do not proceed with installation until discrepancies have been fully resolved.

3.2 ERECTION

A. Performed by manufacturer and scheduled after all concrete and roofing work in vicinity is complete and cleaned. Furnish column sleeves (and anchor bolts if required) to elevations and dimensions on shop drawings. Align columns and beams with care before columns are grouted. Where applicable, fill column interiors with grout to lowest edge of drain hole and grout sloped to drawing prior to installation of deflector plate.

B. Grout 200# compressive strength. Mix by volume, 1 part Portland cement and 3 parts masonry sand. Add water to make pouring consistency and vibrate with small rod to fill voids. Use an accelerator during cold weather.

C. Take extreme care to prevent damage or scratching.

D. Perform neat miters and tight fitted joints.

3.3 CLEANING

A. Upon completion, clean surfaces that have become soiled or coated as a result of work in this section, using proper methods which will not scratch nor otherwise damage finished surfaces.

B. Protect work against damage until final acceptance. Repair or provide new component to satisfaction of Architect work that becomes damaged prior to final acceptance.

END OF SECTION 105300

SECTION 105530 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Valve tags.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.

D. Valve-numbering scheme.

E. Valve Schedules: Provide for fire-suppression piping system. Include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:
1. Material and Thickness: Brass, 0.032 inch thick, with predrilled or stamped holes for attachment hardware.
2. Letter and Background Color: As indicated for specific application under Part 3.
3. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
4. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
5. Fasteners: Stainless steel rivets or self-tapping screws.
6. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 VALVE TAGS

A. Description: Stamped or engraved with 1/4-inch letters for piping-system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.04 inch thick, with predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Include valve-tag schedule in operation and maintenance data.

2.3 WARNING TAGS

A. Description: Preprinted accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum .
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption, such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Letter and Background Color: As indicated for specific application under Part 3.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 INSTALLATION GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be installed.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.3 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of fire-suppression equipment.

B. Sign and Label Colors:

1. White letters on an ANSI Z535.1 safety-red background.

C. Locate equipment labels where accessible and visible.

D. Arc-Flash Warning Signs: Provide arc-flash warning signs on electrical disconnects and other equipment where arc-flash hazard exists, as indicated on Drawings, and in accordance with requirements of OSHA and NFPA 70E, and other applicable codes and standards.

3.4 INSTALLATION OF WARNING TAPE

A. Warning Tape Color and Pattern: Yellow background with black diagonal stripes.

B. Install warning tape on pipes and ducts, with cross-designated walkways providing less than 6 ft. of clearance.

C. Locate tape so as to be readily visible from the point of normal approach.

3.5 INSTALLATION OF VALVE TAGS

A. Install tags on valves and control devices in fire-suppression piping systems. List tagged valves in a valve-tag schedule in the operating and maintenance manual. Include the identification "FSV" on all fire-suppression system valve tags.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below.

1. Valve-Tag Size and Shape:
   a. Wet-Pipe Sprinkler System: 1-1/2 inches, square.

2. Valve-Tag Color: White letters on an ANSI Z535.1 safety-red background.

END OF SECTION 10553

SECTION 108000 - COMMISSIONING OF FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes Cx process requirements for the following fire-suppression systems, assemblies, and equipment:

1. Water-based fire-suppression systems.

B. Related Requirements:

1. Section "General Commissioning Requirements" for general Cx process requirements and CxA responsibilities.
2. For construction checklists, comply with requirements in various Division 21 Sections specifying fire-suppression systems, system components, equipment, and products.

1.2 DEFINITIONS

A. Cx: Commissioning, as defined in Section "General Commissioning Requirements."

B. CxA: Commissioning Authority, as defined in Section "General Commissioning Requirements."

C. IgCC: International Green Construction Code.

D. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fire-suppression testing technician.

B. Construction Checklists:

1. Draft Cx plan, including draft construction checklists to be prepared by CxA under Section "General Commissioning Requirements." Contractor is to review Construction Checklist in accordance with requirements in Section "General Commissioning Requirements" and NFPA 3 and to resolve any issues with the CxA.
2. Cx plan, including material, installation, and performance construction checklists for systems, assemblies, subsystems, equipment, and components relating to fire-suppression system to be part of the Cx process and in accordance with requirements in Section 019113 "General Commissioning Requirements" and NFPA 3.

C. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Contractor, provide the following:

1. Equipment/instrument identification number.
2. Planned Cx application or use.
3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' proprietary instrumentation and tools. For each instrument or tool, identify the following:

    a. Instrument or tool identification number.
    b. Equipment schedule designation of equipment for which the instrument or tool is required.
    c. Manufacturer, make, model, and serial number.
    d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.4 QUALITY ASSURANCE

A. Fire-Suppression Testing Technician Qualifications: Technicians to perform fire-suppression Construction Checklist verification tests, Construction Checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:

1. Journey level or equivalent skill level with knowledge of fire-suppression system, electrical concepts, and building operations.
2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.

B. Clean-Agent Fire-Suppression Systems Testing Technician Qualifications: Technicians to perform clean-agent fire-suppression system Construction Checklist verification tests, Construction Checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:

1. Journey level or equivalent skill level. Vocational school four-year-program graduate or an Associate's degree in mechanical systems, fire-suppression systems, or similar field. Degree requirement may be offset by three years' experience in servicing fire-suppression systems in the clean-agent fire-suppression systems industry. Generally, required knowledge includes clean-agent fire-suppression systems, electrical concepts, building operations, and application and use of tools and instrumentation to measure performance of fire-suppression system equipment, assemblies, and systems.
2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.

C. Testing Equipment and Instrumentation Quality and Calibration:

1. Capable of testing and measuring performance within the specified acceptance criteria.

2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
3. Be maintained in good repair and operating condition throughout duration of use on Project.
4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

D. Proprietary Test Instrumentation and Tools:

1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, shall comply with the following:

a. Be calibrated by manufacturer with current calibration tags permanently affixed.
b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
c. Fire-suppression system proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 Cx PROCESS

A. Perform Cx process for fire-suppression system in accordance with the following:

1. Section "General Commissioning Requirements."
2. NFPA 3.

3.2 CONSTRUCTION CHECKLISTS

A. Preliminary detailed construction checklists are to be prepared under Section "General Commissioning Requirements" for each fire-suppression system, assembly, subsystem, equipment, and component required to be commissioned, as detailed in NFPA 3. Contractor performs the following:

1. Review fire-suppression system preliminary construction checklists and provide written comments on Construction Checklist items where appropriate.
2. Return preliminary Construction Checklist with review comments within 10 days of receipt.
3. When review comments have been resolved, the CxA will provide final construction checklists marked "Approved for Use, (date)."

4. Use only construction checklists marked "Approved for Use, (date)" when performing tests. Mark construction checklists in the appropriate place, as indicated Project events are completed, and provide pertinent details and other information.

B. Prepare preliminary detailed construction checklists for each fire-suppression system, assembly, subsystem, equipment, and component required to be commissioned, as detailed in NFPA 3.

1. Submit preliminary construction checklists to CxA and Designer for review.
2. When review comments have been resolved, the CxA will provide final construction checklists marked "Approved for Use, (date)."
3. Use only construction checklists marked "Approved for Use, (date)" when performing tests. Mark construction checklists in the appropriate place, as indicated Project events are completed, and provide pertinent details and other information.

C. Systems Required to Be Commissioned under IgCC:

1. Water-pumping and -mixing systems over 5 hp and purification systems.

D. Additional Systems Required to Be Commissioned:

1. Facility fire-suppression water-distribution piping outside the building, including the following:

a. Fire-suppression water piping, fittings, and specialties outside the building.
b. Hydrants and fire-department connections.
c. Fire-alarm devices.
d. Meters and meter pits.
e. Outdoor water-storage tanks.
f. Sleeves and sleeve seals.
g. Meters and gauges.
h. General-duty and specialty valves.
i. Hangers and supports.
j. Vibration isolation.
k. Identification.
l. Insulation.

2. Fire-suppression sprinkler systems, including the following:

a. Wet-pipe sprinkler piping, fittings, sprinklers, and specialties.
b.
c. Sleeves and sleeve seals.
d. Meters and gauges.
e. General-duty and specialty valves.
f. Hangers and supports.
g. Vibration isolation.
h. Identification.
i. Insulation.

3. Documentation:

a. Fire-suppression system operating manuals.
b. Documentation of required Cx.
c. Documentation of required operator training.

3.3 Cx TESTING PREPARATION

A. Certify that fire-suppression systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating in accordance with the Contract Documents and approved submittals.

B. Certify that fire-suppression system instrumentation and control systems have been completed and calibrated, that they are operating in accordance with the Contract Documents and approved submittals, and that pretest set points have been recorded.

C. Set systems, subsystems, and equipment into operating mode to be tested in accordance with approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.4 Cx TEST CONDITIONS

A. Perform tests using design conditions, whenever possible.

1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

B. If tests cannot be completed because of a deficiency outside the scope of the fire-suppression system, document the deficiency and report it to Architect. After deficiencies are resolved, reschedule tests.

C. If seasonal testing is specified, complete appropriate initial performance tests and documentation, and schedule seasonal tests.

3.5 Cx TESTS COMMON TO FIRE-SUPPRESSION SYSTEMS

A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.

B. Test systems, assemblies, subsystems, equipment, and components for operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response compared to acceptance criteria.

C. Coordinate schedule with, and perform Cx activities at the direction of, CxA.

D. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 21 Sections specifying fire-suppression systems and equipment.

E. Provide technicians, instrumentation, tools, and equipment to perform and document the following:

1. Cx Construction Checklist verification tests.
2. Cx Construction Checklist verification test demonstrations.

3.6 CONSTRUCTION CHECKLIST EXAMPLES

A. Vibration Isolation in Fire-Suppression Systems:

1. Prerequisites: Acceptance of results of construction checklists for vibration.
2. Components to Be Tested:

    a. Vibration isolation control devices in water-based fire-suppression systems.
    b. Support systems.

3. Test Purpose: Evaluate effectiveness of vibration isolationcontrol devices.
4. Test Conditions: Measure vibration of the facility structure at threelocations designated by Owner's witness while the isolated equipment operates.

5. Acceptance Criteria: Structure-borne vibration not to exceed specified performance.

B. Supervision of Fire-Protection Valves in Water-Based Fire-Suppression Systems:

1. Prerequisites: Acceptance of results of construction checklists for valves specified in the following Sections:

    a. Section "General-Duty Valves for Water-Based Fire Protection Piping."
    b. Section "Water-Based Fire-Suppression Systems."
    c. Section "Addressable Fire-Alarm Systems."
    d. Section "Site Water Distribution Piping."

2. Equipment and Systems to Be Tested:

    a. Supervised valves in water-based fire-suppression systems.
    b. Division fire-detection and -alarm systems.

3. Test Purpose: Verify generation of supervisory alarm at the fire-alarm control panel in response to activation of valve supervision device or tamper switch.

4. Test Conditions:

    a. Fire-alarm system operating in normal, automatic mode.
    b. Activate valve supervision devices and tamper switches, one at a time.

5. Acceptance Criteria: Activation of valve supervision device or tamper switch generates supervisory alarm at fire-alarm control panel.
6. Equipment and Systems to Be Tested:
    a. Interface with fire-alarm control panel.

7. Test Purpose:

    a. Evaluate response to ambient temperature below freeze-protection set point.
    b. Evaluate heating cable fault alarm.

8. Test Conditions:

    a. Subject temperature sensor to temperature approximately 3 deg F above freeze-protection set point (initial set point 41 deg F). Monitor sensed temperature with a calibration-grade thermometer. Gradually change set point or sensed temperature until freeze-protection circuit is energized.
    b. Subject temperature sensor to temperature approximately 3 deg F below freeze-protection set point (initial set point 41 deg F). Monitor sensed temperature with a calibration-grade thermometer. Gradually change set point or sensed temperature until freeze-protection circuit is de-energized.
    c. Simulate an electrical fault on the heating cable.

9. Acceptance Criteria:

    a. Freeze-protection circuit is energized at set-point temperature of minus 2 deg F.
    b. Freeze-protection circuit is de-energized at set-point temperature of plus 2 deg F.
    c. Heater trace circuit controller initiates an alarm of cable fault. Alarm is correctly reported at the fire-alarm control panel.

END OF SECTION 108000

SECTION 108001 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes toilet and bath accessory items as scheduled.

1.3 SUBMITTALS

A General: Submit the following according to Conditions of Contract and Division 1 Specifications Sections.

B. Product data for each toilet accessory item specified, including construction details relative to materials, dimensions, gages, profiles, mounting method, specified options, and finishes.

C. Cut sheets of each toilet accessory item to verify design, operation, and finish requirements.

D. Schedule indicating types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for project.

E. Setting drawings where cutouts are required in other work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.

F. Maintenance instructions including replaceable parts and service recommendations.

1.4 QUALITY ASSURANCE

A. Inserts and Anchorages: Furnish accessory manufacturers' standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.

B. Single-Source Responsibility: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to the TPM.

1.5 PROJECT CONDITIONS

A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

1.6 WARRANTY

A. Warranty: Submit a written warranty executed by mirror manufacturer, agreeing to replace any mirrors that develop visible silver spoilage defects within warranty period.

B. Warranty Period: 15 years from date of Substantial Completion.

C. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide toilet accessories by one of the following:

1. A & J Washroom Accessories, Inc.; www.ajwashroom.com.
2. American Specialties, Inc.; www.americanspecialties.com.
3. Bobrick Washroom Equipment, Inc.; www.bobrick.com/Bobrick.
4. Bradley Corporation; www.bradleycorp.com.
5. GAMCO Commercial Restroom Accessories, a Division of Bobrick Washroom Equipment, Inc.; www.gamcousa.com.
6. McKinney/Parker Washroom Accessories Corp.

2.2 MATERIALS, GENERAL

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034 inch minimum thickness.

B. Galvanized Steel Sheet: ASTM A 653/A 653M-08, G60.

C. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456-03, Type SC 2.

D. Baked Enamel Finish: Factory-applied, gloss white, baked acrylic enamel coating.

E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M-05, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

2.3 TOILET AND BATH ACCESSORIES

A. Accessory items shall conform to the requirements specified below.

B. Grab Bar: Grab bars shall be 18 gauge, 1-1/4 inches OD Type 304 stainless steel. Grab bar shall be form and length as indicated. Exposed mounting flange shall have mounting holes concealed. Grab bar shall have satin finish. Installed bars shall be capable of withstanding a 500 pound vertical load without coming loose from the fastenings and without obvious permanent deformation. Space between wall and grab bar shall be 1-1/2 inch.

C. Mirrors, Glass: Glass for mirrors shall be Type I transparent flat type, Class 1-clear Tempered. Glazing Quality q1 1/4 inch thick conforming to ASTM C 1036-06. Glass shall be coated on one surface with silver coating, copper protective coating, and mirror backing paint. Silver coating shall be highly adhesive pure silver coating of a thickness which shall provide reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, and shall be free of pinholes or other defects. Copper protective coating shall be pure bright reflective copper, homogeneous without sludge, pinholes or other defects, and shall be of proper thickness to prevent "adhesion pull" by mirror backing paint. Mirror backing paint shall consist of two coats of special scratch and abrasion-resistant paint and shall be baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

D. Mirror, Tilt: Tilt mirror shall be surface mounted and shall provide full visibility for persons in a wheelchair. Mirror shall have adjustable tilt, extending at least 4 inches from the wall at the top and tapering to 1 inch at the bottom. Size shall be in accordance with the drawings. Glass for mirrors shall conform to ASTM C 1036-06 and paragraph Glass Mirrors. MT mirrors shall be provided with heavy-duty shelves. Glass shall be tempered.

E. Combination Paper Towel Dispenser/Waste Receptacle Units: Dispenser/receptacle shall be semi-recessed and surface-mounted and shall have a capacity of 600 sheets of C-fold, single-fold, or quarter-fold towel. Waste receptacle shall be designed to be locked in unit and removable for service. Locking mechanism shall be tumbler key lock. Waste receptacle shall have a capacity of 12 gallons. Unit shall be fabricated of not less than 0.30 inch stainless steel welded construction with all exposed surfaces having a satin finish. Waste receptacle that accepts reusable liner standard for unit manufacturer shall be provided.

G. Soap Dispenser: Soap dispenser shall be wall-mounted, liquid type consisting of a vertical Type 316 stainless steel, chrome plated brass with holding capacity of 16 fluid ounces with a corrosion-resistant all-purpose valve that dispenses liquid soaps, lotions, detergents and antiseptic soaps.

I. Toilet Tissue Dispenser: Toilet tissue holder shall be Type II - surface mounted with two rolls of standard tissue stacked vertically. Cabinet shall be stainless steel, satin finish.

J. Robe Hook: Robe Hooks shall be fabricated from type 304, heavy gauge No. 4 satin finish stainless steel.

K. Surface: Mounted Paper Towel Dispenser: Dispenser shall be surface-mounted and shall have a capacity of 350 Multi-Fold or 200-C Fold paper towels. Unit shall be fabricated of Type 304 (18-8), 22 Gauge stainless steel with exposed surfaces in architectural satin finish. Smooth corners, free of burrs and sharp edges. Provide with keyed tumbler lock. Cabinet hinged at bottom for loading paper towels. Refill indicator slot on face of cabinet. Rolled edge on dispenser opening.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Toilet accessories shall be securely fastened to the supporting construction in accordance with the manufacturer's approved instructions. Accessories shall be protected from damage from the time of installation until acceptance.

3.2 CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

3.3 SCHEDULE

A. As indicated on the Drawings.

END OF SECTION 108001

SECTION 116623 - GYMNASIUM EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Safety pads.

B. Related Requirements:

1. Section 116653 "Gymnasium Dividers."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. If applicable, include assembly, disassembly, and storage instructions for removable equipment.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that products contain no urea formaldehyde.
2. Laboratory Test Reports for Credit IEQ 4.4: For composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: For gymnasium equipment.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include details of field assembly for removable equipment, connections, installation, mountings, floor inserts, attachments to other work, and operational clearances.
3. Include transport and storage accessories for removable equipment.

D. Samples: For each exposed product and for each item and color specified.

E. Samples for Verification: For the following products:

1. Pad Fabric: Wall padding not less than 3 inches square, and corner and column Samples not less than 3 inches long, with specified treatments applied. Mark face of material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of gymnasium equipment.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For gymnasium equipment to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: All components to be installed by a trained and qualified installer approved by the manufacturer.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install gymnasium equipment until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Verify position and elevation of wall pads.

1.8 COORDINATION

A. Coordinate installation of floor inserts with structural floors and finish flooring installation and with court layout and game lines and markers on finish flooring.

B. Coordinate layout and installation of overhead-supported gymnasium equipment and suspension-system components with other construction including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium equipment that fail in materials or workmanship within specified warranty period of one (1) year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain wall pads from single source from single manufacturer.

2.2 SAFETY PADS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings:
   1. Jaypro Sports Construction Group.
      Jaypro Sports, LLC., 976 Hartford Turnpike, Waterford, Connecticut 06385. Toll Free 800-243-0533. Phone 860-447-3001. Fax 800-988-3363. Email: info@jaypro.com web: www.jaypro.com .

C. Safety Pad Surface-Burning Characteristics: ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

D. Pad Coverings: Provide safety pad fabric covering that is fabricated from puncture- and tear-resistant, PVC-coated polyester or nylon-reinforced PVC fabric, not less than 14-oz./sq. yd (475-g/sq. m) and treated with fungicide for mildew resistance; with surface-burning characteristics indicated.

E. Wall Safety Pads: Padded wall wainscot panels designed to be attached in a continuous row; each panel section consisting of fill laminated to backer board with visible surfaces fully covered by seamless fabric covering, free of sag and wrinkles and firmly attached to back of backer board.

   1. Backer Board: Not less than 3/8-inch- thick plywood, mat formed, or composite panel.
   2. Fill: Multiple-impact-resistant foam not less than 2-inch- thick bonded polyurethane, 6.0-lb/cu. ft. (96-lb/cu. ft. (96-kg/cu. m) density
   3. Size: Each panel section, 24 inches (600 mm) wide by not less than 72 inches (1800 mm) long.
   4. Number of Modular Panel Sections: As indicated.
   5. Installation Method: Concealed mounting Z-clips.
   6. Fabric Covering Color(s): As selected by Architect from manufacturer's full range for color(s).

F. Corner Wall Safety Pads: Wall corner pad consisting of not less than 1-1/4-inch- (32-mm-) thick, multiple-impact-resistant, closed-cell, polyethylene-foam filler, covered on both sides and all edges by fabric covering with backer board and manufacturer's standard anchorage to wall.

   1. Length: Each pad matching length of wall safety pads.

2. Fabric Covering Color(s): Match color of wall safety pads.

G. Column Safety Pads: Pads covering exposed flange of columns to height indicated, consisting of not less than 1-1/4-inch- (32-mm-) thick, multiple-impact-resistant, closed-cell, polyethylene-foam filler, covered on both sides and all edges by fabric covering with [backer board and manufacturer's standard anchorage to column.

1. Length: Each pad not less than 72 inches (1800 mm).
2. Fabric Covering Color(s): Match color of wall safety pads.

H. Cut-out Trim: Provide manufacturer's standard flanged cut-out trim kits for fitting pads around switches, receptacles, and other obstructions.

1. Color: Gray.

2.3 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for use and finish type indicated.

1. Extruded Bars, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
2. Cast Aluminum: ASTM B 179.
3. Flat Sheet: ASTM B 209 (ASTM B 209M).

B. Steel: Comply with the following:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Tubing: ASTM A 500/A 500M or ASTM A 513, cold formed.
3. Steel Sheet: ASTM A 1011/A 1011M.

C. Particleboard: ANSI A208.1.

D. Equipment Wall-Mounted Board: Wood, transparent or neutral-color-painted finish, size, and quantity as required to mount gymnasium equipment according to manufacturer's written instructions.

E. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard corrosion-resistant or noncorrodible units; concealed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for play court layout, alignment of mounting substrates, installation tolerances, operational clearances, and other conditions affecting performance of the Work.

1. Verify critical dimensions.
2. Examine supporting structure, subfloors, and footings below finished floor.

3. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements are clearly marked. Locate reinforcements and mark locations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written installation instructions. Complete equipment field assembly where required.

B. Unless otherwise indicated, install gymnasium equipment after other finishing operations, including painting, are completed.

C. Permanently Placed Gymnasium Equipment and Components: Install rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relation to adjacent construction; and aligned with court layout.

D. Wall Corner Column Safety Pads: Mount with bottom edge at 4 inches (102 mm) above finished floor.

E. Cut-out Trim: Limit cuts in face of padding from trim unit's corner-to-corner outside dimensions. Install with ends of cuts concealed behind trim flange.

F. Anchoring to In-Place Construction: Use anchors and fasteners where necessary to secure built-in and permanently placed gymnasium equipment to structural support and to properly transfer load to in-place construction.

G. Connections: Connect electric operators to building electrical system.

H. Removable Gymnasium Equipment and Components: Assemble in place to verify that equipment and components are complete and in proper working order. Instruct Owner's designated personnel in properly handling, assembling, adjusting, disassembling, transporting, storing, and maintaining units.

3.3 ADJUSTING

A. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and moving parts.

3.4 CLEANING

A. After completing gymnasium equipment installation, inspect components. Remove spots, dirt, and debris and touch up damaged shop-applied finishes according to manufacturer's written instructions.

B. Replace gymnasium equipment and finishes that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Owner's maintenance personnel to adjust, operate, and maintain gymnasium equipment.

END OF SECTION 116623

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manually operated roller shades with [single] [double] rollers.
2. Manually operated roller shades for skylights.

B. Related Requirements:

1. Section 061000 Rough Carpentry for wood blocking and grounds for mounting roller shades and accessories.
2. Section 079000 Joint Sealers for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.3 ALLOWANCES

A. Roller shades are part of Window-Covering Allowance.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified, 10 inches (250 mm) long.

D. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

E. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than 3 inches (76 mm) square. Mark interior face of material if applicable.
2. Roller Shade: Full-size operating unit, not less than 16 inches (400 mm) wide by 36 inches (900 mm) long for each type of roller shade indicated.
3. Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.

F. Product Schedule: For roller shades.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of shadeband material.

C. Product Test Reports: For each type of shadeband material, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

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

1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS – RS Hunter Douglas Series 7505 5% Openness

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Stainless steel

a. Loop Length: Full length of roller shade
b. Limit Stops: Provide upper and lower ball stops.
c. Chain-Retainer Type: Clip, jamb mount

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.

a. Provide for shadebands that weigh more than 10 lb (4.5 kg) or for shades as recommended by manufacturer, whichever criterion is more stringent.

B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of interior face of shade
2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller
3. Shadeband-to-Roller Attachment: [Manufacturer's standard method

C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

E. Shadebands:

1. Shadeband Material: Light-filtering fabric
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

    a. Type: Enclosed in sealed pocket of shadeband material Retain "Color and Finish" Subparagraph below for exposed bottom bars.
    b. Color and Finish: As indicated on drawings

F. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

    a. Shape: L-shaped
    b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 4 inches (102 mm)

2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.

    a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than 4 inches (102 mm)

3. Endcap Covers: To cover exposed endcaps.
4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

    a. Height: Provide manufacturers standard height fascia as required to conceal roller and shade.
    b. Provide pocket with lip at lower edge to support acoustical ceiling panel.

5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.

6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
8. Installation Accessories Color and Finish: As selected from manufacturer's full range

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with [NFPA 701] <Insert requirement>. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Source: Roller shade manufacturer
2. Type: Fiberglass textile with PVC film bonded to both sides
3. Thickness: 0.016”
4. Weight: 10.7 oz/yd
5. Roll Width: 78”, 98” or 122”
6. Orientation on Shadeband: Up the bolt
7. Color: As indicated on Drawings

2.4 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
2. Skylight Shades: Provide battens and seams at uniform spacings along shadeband as required to ensure shadeband tracking and alignment through its full range of movement without distortion or sag of material.
3. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, [locations of connections to building electrical system,]and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

B. Roller Shade Locations: As indicated on Drawings

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 122413

SECTION 139000 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Addressable fire-alarm system.

B. Related Requirements:
   1. Section "Door Hardware" for magnetic door holders that release in response to fire-alarm outputs.
   2. Section "Low-Voltage Electrical Power Conductors and Cables" or Section "Control Voltage Electrical Power Cables" for cables and conductors for fire-alarm systems.

1.2 DEFINITIONS

A. DACT: Digital alarm communicator transmitter.

B. EMT: Electrical metallic tubing.

C. FACU: Fire-alarm control unit.

D. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.

E. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the 2007 Energy Independence and Security Act (EISA).

F. NICET: National Institute for Certification in Engineering Technologies.

G. PC: Personal computer.

H. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

   1. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power supply having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
   2. Low Voltage: Listed and labeled for use in circuits supplied by a Class 1 or other power supply having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.

1.3 ACTION SUBMITTALS

A. Approved Permit Submittal: Submittals must be approved by authorities having jurisdiction prior to submitting them to Architect.

B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

C. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in "Documentation" section of "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, and details, including details of attachments to other Work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Annunciator panel details as required by authorities having jurisdiction.
5. Detail assembly and support requirements.
6. Include voltage drop calculations for notification-appliance circuits.
7. Include battery-size calculations.
8. Include input/output matrix.
9. Include written statement from manufacturer that equipment and components have been tested as a system and comply with requirements in this Section and in NFPA 72.
10. Include performance parameters and installation details for each detector.
11. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
12. Provide control wiring diagrams for fire-alarm interface to HVAC; coordinate location of duct smoke detectors and access to them.

    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring and equipment required for HVAC unit shutdown on alarm.
    c. Locate detectors in accordance with manufacturer's written instructions.

13. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.

14. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Qualification Statements: For Installer.

C. Sample Warranty: Submittal must include line item pricing for replacement parts and labor.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:

a. Comply with "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire-Alarm and Emergency Communications System Record of Completion Documents" in accordance with "Completion Documents" Article in "Documentation" section of "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between devices and equipment. Each conductor must be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Device addresses.
f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
g. Record copy of site-specific software.
h. Provide "Inspection and Testing Form" in accordance with "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals.

i. Manufacturer's required maintenance related to system warranty requirements.
j. Abbreviated operating instructions for mounting at FACU and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On USB media.
3. Device address list.
4. Printout of software application and graphic screens.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials that match products installed and that are packaged

with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
3. Smoke Detectors]: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
5. Keys and Tools: One extra set for access to locked or tamper-proofed components.
6. Audible and Visual Notification Appliances: One of each type installed.
7. Fuses: Two of each type installed in system. Provide in box or cabinet with compartments marked with fuse types and sizes.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Personnel must be trained and certified by manufacturer for installation of units required for this Project.
2. Installation must be supervised by personnel certified by NICET as fire-alarm Level II technician.
3. Obtain certification by NRTL in accordance with NFPA 72.
4. Licensed or certified by authorities having jurisdiction.

1.8 FIELD CONDITIONS

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail because of defects in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ADDRESSABLE FIRE-ALARM SYSTEM

A. Description:
1. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice-and-strobe notification for evacuation for the main building. Horn and strobe

notification is permitted for the teacher's lounge.

B. Performance Criteria:

1. Regulatory Requirements:

a. Fire-Alarm Components, Devices, and Accessories: Listed and labeled by a NRTL in accordance with NFPA 70 for use with selected fire-alarm system and marked for intended location and application.

2. General Characteristics:

a. Automatic sensitivity control of certain smoke detectors.
b. Fire-alarm signal initiation must be by one or more of the following devices:
   1) Manual stations.
   2) Smoke detectors.
   3) Automatic sprinkler system water flow.

c. Fire-alarm signal must initiate the following actions:
   1) Continuously operate alarm notification appliances, including voice evacuation notices.
   2) Identify alarm and specific initiating device at FACU and remote annunciators.
   3) Transmit alarm signal to remote alarm receiving station.
   4) Unlock electric door locks in designated egress paths.
   5) Release fire and smoke doors held open by magnetic door holders.
   6) Activate voice/alarm communication system.
   7) Recall elevators to primary or alternate recall floors.
   8) Activate elevator power shunt trip.
   9) Activate emergency lighting control.
   10) Record events in system memory.

d. Supervisory signal initiation must be by one or more of the following devices and actions:
   1) Valve supervisory switch.
   2) Elevator shunt-trip supervision.
   3) Zones or individual devices have been disabled.
   4) FACU has lost communication with network.
   5) Duct smoke detectors.

e. System trouble signal initiation must be by one or more of the following devices and actions:
   1) Open circuits, shorts, and grounds in designated circuits.
   2) Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
   3) Loss of communication with addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
   4) Loss of primary power at FACU.

5) Ground or single break in internal circuits of FACU.
6) Abnormal ac voltage at FACU.
7) Break in standby battery circuitry.
8) Failure of battery charging.
9) Abnormal position of switch at FACU or annunciator.
10) Voice signal amplifier failure.

f. System Supervisory Signal Actions:
1) Identify specific device initiating event at FACU.
2) Record event on system printer.
3) After time delay of 200 seconds, transmit trouble or supervisory signal to remote alarm receiving station.
4) Transmit system status to building management system.
5) Display system status on graphic annunciator.
6) Switch HVAC equipment controls to fire-alarm mode.

g. Network Communications:

1) Provide network communications for fire-alarm system in accordance with fire-alarm manufacturer's written instructions.
2) Provide network communications pathway per manufacturer's written instructions and requirements in NFPA 72 and NFPA 70.

h. Device Guards:

1) Description: Welded wire mesh of size and shape for manual station, smoke detector, gong, or other device requiring protection.

a) Factory fabricated and furnished by device manufacturer.
b) Finish: Paint of color to match protected device.

i. Document Storage Box:

1) Description: Enclosure to accommodate standard 8-1/2-by-11 inch manuals and loose document records. Legend sheet will be permanently attached to door for system required documentation, key contacts, and system information. Provide two key ring holders with location to mount standard business cards for key contact personnel.
2) Material and Finish: 18-gauge cold-rolled steel; four mounting holes.
3) Color: Red powder-coat epoxy finish.
4) Labeling: Permanently screened with 1 inch high lettering "SYSTEM RECORD DOCUMENTS" with white indelible ink.
5) Security: Locked with 3/4 inch barrel lock. Provide solid 12 inch stainless steel piano hinge.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Preinstallation Testing: Perform verification of functionality of installed components of existing system prior to starting work. Document equipment or components not functioning as designed.

B. Protection of In-Place Conditions: Protect devices during construction unless devices are placed in service to protect facility during construction.

3.3 INSTALLATION OF EQUIPMENT

A. Comply with NECA 305, NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before other trades have completed cleanup must be replaced.
2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.
3.

B. Install wall-mounted equipment, with tops of cabinets not more than 78 inch above finished floor.

C. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in normal path of egress within 60 inch of exit doorway.
2. Mount manual fire-alarm box on background of contrasting color.
3. Operable part of manual fire-alarm box must be between 42 and 48 inch above floor level. Devices must be mounted at same height unless otherwise indicated.

D. Smoke- and Heat-Detector Spacing:

1. Comply with "Smoke-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with "Heat-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Smooth ceiling spacing must not exceed 30 ft. .
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined in accordance with Annex A or Annex B in NFPA 72.
5. HVAC: Locate detectors not closer than 36 inch from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inch from lighting fixture and not directly above pendant mounted or indirect lighting.

E. Install cover on each smoke detector that is not placed in service during construction. Cover must remain in place except during system testing. Remove cover prior to system turnover.

F. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend full width of duct. Tubes more than 36 inch long must be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

G. Remote Status and Alarm Indicators: Install in visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

H. Audible Alarm-Indicating Devices: Install not less than 6 inch below ceiling. Install bells and horns on flush-mounted back boxes with device-operating mechanism concealed behind grille. Install devices at same height unless otherwise indicated.

I. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inch below ceiling. Install devices at same height unless otherwise indicated.

J. Device Location-Indicating Lights: Locate in public space near device they monitor.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."

2. Nameplate must be laminated acrylic or melamine plastic signs with black background and engraved white letters at least 1/2 inchhigh.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

C. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

3.6 PATHWAYS

A. Pathways above recessed ceilings and in inaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inch above floor must be installed in EMT.

B. Pathways must be installed in EMT.

C. Exposed EMT must be painted red enamel.

3.7 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.

B. Make addressable connections with supervised interface device to the following devices and systems. Install interface device less than 36 inch from device controlled. Make addressable confirmation connection when such feedback is available at device or system being controlled.
1. Magnetically held-open doors.
2. Alarm-initiating connection to elevator recall system and components.
3. Supervisory connections at valve supervisory switches.
4. Supervisory connections at elevator shunt-trip breaker.

3.8 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."

B. Install framed instructions in location visible from FACU.

3.9 GROUNDING

A. Ground FACU and associated circuits in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Ground shielded cables at control panel location only. Insulate shield at device location.

3.10 FIELD QUALITY CONTROL

A. Field tests must be witnessed by authorities having jurisdiction.

B. Administrant for Tests and Inspections:

1. Engage qualified testing agency to administer and perform tests and inspections.
2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection must be based on completed record Drawings and system documentation that is required by "Completion Documents, Preparation" table in "Documentation" section of "Fundamentals" chapter in NFPA 72.
    b. Comply with "Visual Inspection Frequencies" table in "Inspection" section of "Inspection, Testing and Maintenance" chapter in NFPA 72; retain "Initial/Reacceptance" column and list only installed components.

2. System Testing: Comply with "Test Methods" table in "Testing" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for public operating mode in accordance with manufacturer's written instructions. Perform test using portable sound-level meter complying with Type 2 requirements in ASA S1.4 Part 1/IEC 61672-1.
4. Test audible appliances for private operating mode in accordance with manufacturer's written instructions.
5. Test visible appliances for public operating mode in accordance with manufacturer's written instructions.
6. Factory-authorized service representative must prepare "Fire Alarm System Record of Completion" in "Documentation" section of "Fundamentals" chapter in NFPA 72 and "Inspection and Testing Form" in "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.11 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system. Allow Owner to record training.

3.12 MAINTENANCE

3.13 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement must include software support for one year.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within one year from date of Substantial Completion. Upgrading software must include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

END OF SECTION 13900

SECTION 142400 - HYDRAULIC ELEVATORS

1.1 SUMMARY

A. Hydraulic passenger elevators.

1.2 SUBMITTALS:

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures; hoistway entrances; and operation, control, and signal systems.

B. Shop Drawings:

1. Include plans, elevations, sections, and large-scale details indicating service at each landing; machine room layout; coordination with building structure; relationships with other construction; and locations of equipment.
2. Include large-scale layout of car-control station.
3. Indicate maximum dynamic and static loads imposed on building structure at points of support as well as maximum and average power demands.

C. Samples for Initial Selection: For finishes involving color selection.

D. Manufacturer Certificates: Signed by elevator manufacturer, certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

1.3 WARRANTY

A. Elevator Work: 2 years from date of occupancy.

B. Related Requirements:

Section 033000 “Cast-in Place Concrete”

Section 042000 “Unit Masonry”

Section 051200 “Structural Steel Framing”

1.4 ELEVATORS

A. Basis of Design: Otis HydroFit 2100 MRL, 100 fpm.

B. Cylinder Type: Holeless, beside the car.

C. Rated Load: 2100 lb (953 kg).

D. Rated Speed: 100 fpm (0.51 m/s).

E. Operation System: Single elevator.

F. Auxiliary Operations:

1. Battery-powered lowering Emergency Lowering Operation.
2. Emergency Alarm.
3. Emergency Communication System.

G. Car Enclosures: Brushed Stainless Steel Wall Panels, Stainless Steel Ceiling Finish with LED Downlights LVT Flooring. Brushed Stainless Handrails, Brushed Door Finish

1. Inside Width: 5’ – 8”.
2. Inside Depth: 4’ – 3”.
3. Inside Height: Manufacturer’s Standard.
4. Front Walls (Return Panels): Stainless steel.
5. Side and Rear Wall Panels: Stainless steel.
6. Doors: Stainless steel.
7. Ceiling: Stainless steel.
8. Handrails: Stainless steel.
9. Floor: LVT.

H. Hoistway Entrances:

1. Width: 36 inches (914 mm).
2. Height: 84 inches (2134 mm).
3. Type: Single-speed side sliding.
4. Frames Stainless steel at each floor.
5. Doors and Transoms Stainless steel.

I. Hall Fixtures: Stainless steel.

1.5 SYSTEMS AND COMPONENTS

A. Pump Units: Mounted on Floor inside hoist way.

1. Motor: Electric induction motor controlled by a variable-frequency control.

B. Hydraulic Fluid: Manufacturer's standard.

1.6 SIGNAL EQUIPMENT

A. Car-Control Stations: Semirecessed or recessed.

B. Firefighters' two-way telephone communication service.

C. Fire-command-center annunciator panel.

1.7 EXECUTION

A. EXAMINATION

1. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.

2. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. FIELD QUALITY CONTROL

1. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

2. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

C. PROTECTION

1. Temporary Use: Comply with the following requirements for elevator used for construction purposes:

a. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.

b. Provide strippable protective film on entrance and car doors and frames.

c. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.

d. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.

e. Do not load elevators beyond their rated weight capacity.

f. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

D. DEMONSTRATION

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate elevator(s).

2. Check operation of elevator with Owner's personnel present before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

E. MAINTENANCE

1. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
   a. Perform maintenance during non-school hours.
   b. Perform emergency callback service during normal working hours.

END OF SECTION 142400

SECTION 150100 - MECHANICAL GENERAL REQUIREMENTS

1.1 APPLICATION:

A. This section applies to all sections of Division 15, "Mechanical" of this project.

1.2 REFERENCES:

A. The publications listed throughout the specifications form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.147, Control of Hazardous Energy
(Lock Out/Tag Out)

1.3 GENERAL:

A. The contract drawings indicate the extent and general arrangement of the work. The contractor shall be responsible for installing the proposed systems as indicated, without violation of applicable codes, standards, or specification requirements. The contractor is also responsible for coordinating the installation and operation of these systems with the other sections of this specification to provide a complete and operable system. Items shall be arranged such that they fit the space as indicated and shall allow adequate and approved clearance for entry, servicing and maintenance. Detailed drawings of any proposed departures due to actual field conditions shall be submitted to the Engineer for approval. All work shall conform to the requirements of the referenced publications and as specified herein.

1.4 CONFORMANCE WITH AGENCY REQUIREMENTS:

A. Where materials or equipment are specified to conform to requirements of the Underwriters' Laboratories, Inc., or other agency, institute, codes, councils or regulatory bodies, the contractor shall submit proof of such conformance. The label or listing of the specified agency will be acceptable evidence. In lieu of the label or listing, the contractor may submit a written certificate from any approved, nationally recognized testing organization adequately equipped and competent to perform such services, stating that the items have been tested and that the units conform to the requirements, including methods of testing, of the specified agency. Where equipment is specified to conform to requirements of the ASME Boiler and Pressure Vessel Code, the design, fabrication, and installation shall conform to the code in every respect and bear the ASME stamp.

1.5 CAPACITIES:

A. Capacities of all equipment and material shall be as indicated in the specifications or shown on the drawings. The Engineer can accept equipment, which may be less than the indicated values in a certain area if its clear the intent of the requirements is fulfilled.

1.6 EQUIPMENT INSTALLATION:

A. Necessary supports shall be provided for equipment and systems components as required. Isolation vibration and systems components units shall be provided to minimize the intensity of vibration transmission to the building structure where required. Concrete pads shall be provided for all outside equipment installed. The pads shall extend 6" pass the unit on all sides.

1.7 ELECTRICAL WORK:

A. Electric-motor-driven equipment specified herein shall be provided complete with motors and controls. Electric equipment and wiring shall be in accordance with Division 16, "Electrical". Electrical characteristics shall be as indicated. Each motor shall be of sufficient capacity to drive the equipment at the specified capacity without exceeding the nameplate rating of motor when operating at proper electrical system voltage. Manual or automatic control and protective or signal devices required for the operation herein specified and any control wiring required for controls and devices, but not shown on the electrical plans, shall be provided under this section as required, this includes 120 volt power wiring to power the controls.

B. HVAC controls conduit and wiring shall conform to Division 16 “Electrical.”

1.8 SUBMITTAL OF MATERIALS AND EQUIPMENT FOR APPROVAL:

A Before purchasing any materials or equipment, the contractor shall submit for approval, in eight bound copies, data of the materials he proposes for the work. Items to be submitted include, but are not limited to, the items listed in each individual section. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's names, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Military, industry, and technical society publication references, and other information necessary to establish contract compliance of each item the contractor proposes to furnish.

1. Shop Drawings. Drawings shall be a minimum of 8.5 inches by 11 inches in size, except as specified otherwise.

2. Manufacturer's Data. Submittals for each manufactured item shall be manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, catalog cuts, and manufacturer's installation recommendations.

3. Cataloged Products. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use at least 2 years prior to bid opening. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer.

4. Submittal Organization. The submittal shall be organized in the same order as the specification sections. The cut sheets shall be marked with equipment number which is shown on the drawings or name for something general such as piping. The submittal sheets shall document the piece of equipment meets the performance requirements of the contract

documents. Note: Unmarked submittals will be rejected without review.

5. Samples. The samples shall be such as to illustrate the functional and aesthetic characteristics of the product.

6. Equipment Application. The contractor shall note on the submittal or in writing of any equipment provided which may not operate satisfactory when installed as indicated on the plans.

1.9 NAMEPLATES:

A. Each major item of equipment shall have the manufacturer's name, address, date of manufacture, serial and model numbers on a plate securely attached to the item.

1.10 VERIFICATION OF DIMENSIONS:

A. The contractor shall visit the premises to thoroughly familiarize him with all details of the work and working conditions and verify all dimensions in the field, and shall advise the Engineer of any discrepancy before performing any work. The contractor shall be specifically responsible for the coordination and proper relation of his work to other structures and to the work of all other trades.

1.11 DRAWINGS:

A. Because of the scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that are required. The contractor shall carefully investigate the structural and finish conditions affecting his work and he shall furnish fittings, offsets, transitions, unions, etc., as may be required to meet such conditions at no additional cost to the Owner.

1.12 CUTTING AND REPAIRING:

A. The work shall be carefully laid out in advance and no excessive cutting of construction will be permitted. Damage to building, piping, wiring, or equipment as a result of cutting for installation shall be repaired by mechanics skilled in the trade involved at no additional expense to the Owner.

1.13 SAFETY REQUIREMENTS:

A. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts located so that any person can come in close proximity thereto shall be fully enclosed or properly guarded. High-temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of a type as specified herein. Items such as catwalks, ladders, and guardrails shall be provided where required for safe operation and maintenance of equipment.

1.14 MANUFACTURER'S RECOMMENDATIONS:

A. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Owner prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these

recommendations can be cause for rejection of the material.

1.15 PAINTING:

A. At the completion of all work, all equipment on this project shall be checked for damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal item that has been provided which has not been painted or otherwise protected shall be painted with primer and final coating as recommended by the paint manufacture for the particular application.

1.16 FINAL CLEANUP:

A. At the completion of all work, all equipment on the project shall be checked and thoroughly cleaned, including coils, plenums, under equipment, and any and all other areas around or in equipment. Any filters used during construction shall be replaced with new filters during final cleanup.

1.17 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Bound instructions. Three complete sets of instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the Owner before the contract is completed. Each set shall be permanently bound and shall have a hard cover. The following identification shall be inscribed on the covers: The words "Operating and Maintenance Instructions", the name and location of the building, the name of the contractor and the contract number. Flysheet shall be placed before instructions covering each subject. The instruction sheet shall be approximately 8-1/2 by 11 inches, with large sheets of drawings folded in. The instructions shall include, but shall not be limited to, the following:

1. Approved wiring and control diagrams, with data to explain the detailed operation and control of each component.

2. A control sequence describing startup, operation and shutdown.

3. Operating and maintenance instructions for each piece of equipment, including lubrication instructions.

4. Manufacturer's bulletins, cuts and descriptive data.

5. Parts list and recommended spare parts.

B. Framed Instructions. Approved wiring and control diagrams showing the complete layout of the entire system, including equipment, piping, valves and control sequence, framed under glass or in approved laminated plastic, shall be posted, where directed. In addition, condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form framed as specified above for the wiring and control diagrams and posted beside the diagram. Proposed diagrams, instructions, and other sheets shall be submitted prior to posting. The framed instructions shall be posted before acceptance-testing of the system.

1.18 DELIVERY AND STORAGE:

A. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations. Damaged or defective items shall be replaced.

1.19 LOCKOUT OF ENERGY SOURCES:

A. Provide appropriate lockout devices for energy isolating valves and for machines or other equipment to prevent unexpected start-up or release of stored electrical, mechanical, hydraulic, pneumatic, thermal, chemical, or other energy in accordance with 29 CFR 1910.147. Lockout devices for valves shall provide a means of attachment to which, or through which, a lock can be affixed or shall have a locking mechanism built into it so that the valve cannot be moved from the lockout position until the lock is removed. Electrical isolation of machines or other equipment shall be in accordance with requirements of Division 16 "Electrical."

1.20 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change orders and other modifications to the contract,
reviewed shop drawings, product data, and samples,
manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
4. Field changes of dimensions and details.
5. Details not on original contract drawings.

G. Submit documents to Owner upon completion of project.

1.21 EQUIPMENT DRAINS

A. The contractor shall mount air-handling units on rails or bases as required to provide enough clearance for the condensate traps.

1.22 ENERGY CODE

A. The equipment installation and ductwork shall meet the requirements of the Florida Energy Code or as required by the specifications whichever is more stringent.

1.23 TRAINING/START UP

A. The contractor shall meet on the site after the job is complete and review the systems operation with the building manager and maintenance personnel. During the review the contractor shall verify that all system settings and timetables are satisfactory with the owner.

END OF SECTION

SECTION 151900 - MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED FOR EACH ITEM)

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe Markers.

1.2 RELATED SECTION

A. Section 15010 - General Mechanical Requirements.

1.3 REFERENCES

A. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Samples: Submit two labels and tags.

F. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 15010.

B. Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved white letters on dark contrasting background color.

2.2TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved white letters on dark contrasting background color. Tag size minimum 1-1/2 inch square.

********** OR **********

B. Metal Tags: Stainless Steel with stamped letters; tag size minimum 1-1/2 inch square with smooth edges.

C. Chart: Typewritten letter size list in anodized aluminum frame.

2.3STENCILS

A. Stencils: With clean cut symbols and letters of following size:
   1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
   2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
   3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
   4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
   5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
   6. Ductwork and Equipment: 2-1/2 inch high letters.

B. Stencil Paint: Semi- gloss enamel, colors conforming to ASME A13.1.

2.4PIPE MARKERS

A. Color: Conform to ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.5CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

B. Color code as follows:

1. Yellow - HVAC equipment
2. Red - Fire dampers/smoke dampers
3. Green - Plumbing valves
4. Blue - Heating/cooling valves

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with manufacturer's recommendations for stencil painting.

3.2 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting in accordance with manufacturer's recommendations.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

G. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with stencil painting. Small devices, such as in-line pumps, may be identified with tags.

H. Identify control panels and major control components outside panels with plastic nameplates.

I. Identify thermostats relating to zones with nameplates.

J. Identify valves in main and branch piping with tags.

K. Identify air terminal unit valves with numbered tags.

L. Tag automatic controls, instruments, and relays. Key to control schematic.

M. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and also pressure for steam piping. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure, enclosure, or obstruction.

N. Identify ductwork with stenciled painting. Identify air handling units with identification number and area served. Locate identification of ductwork at each side of penetration of structure, enclosure, or obstruction.

O. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 15190

SECTION 152610 - PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED FOR EACH ITEM)

A. Piping insulation.

B. Jackets and accessories.

1.2 RELATED SECTION

A. Section 15010 - General Mechanical Requirements

1.3 REFERENCES

ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
ASTM C195 - Mineral Fiber Thermal Insulation Cement.
ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.
ASTM C533 - Calcium Silicate Block and Pipe Thermal Insulation.
ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
ASTM C547 - Mineral Fiber Preformed Pipe Insulation.
ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.
ASTM C640 - Corkboard and Cork Pipe Thermal Insulation.
ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
ASTM E84 - Surface Burning Characteristics of Building Materials.
ASTM E96 - Water Vapor Transmission of Materials.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Product Data: Provide product description, list of materials and thickness for each service, and locations.

C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84.

1.6 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site according to manufacturer's recommendations.

B. Deliver materials to site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

C. Store insulation in original wrapping and protect from weather and construction traffic.

D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 GLASS FIBER

A. Insulation: ASTM C547; rigid molded, noncombustible.
   1. Maximum Thermal Conductivity: ASTM C335, 0.24 at 75 degrees F.
   2. Minimum Service Temperature: -20 degrees F.
   3. Maximum Service Temperature: 850 degrees F.
   4. Maximum Moisture Absorption: 0.2 percent by volume.

B. Vapor Barrier Jacket
   1. ASTM C921, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
   3. Secure with self sealing longitudinal laps and butt strips.
   4. Secure with outward clinch expanding staples and vapor barrier mastic.

C. Tie Wire: 18 gage stainless steel with twisted ends on maximum 12 inch centers.

D. Vapor Barrier Lap Adhesive
   1. Compatible with insulation.

E. Insulating Cement/Mastic
   1. ASTM C195; hydraulic setting on mineral wool.

F. Fibrous Glass Fabric
   1. Cloth: Untreated; 9 oz/sq yd weight.

2. Blanket: 1.0 lb/cu ft density.

G. Outdoor Vapor Barrier Mastic
1. Vinyl emulsion type acrylic, compatible with insulation, white color.

H. Insulating Cement
1. ASTM C449.

2.2CELLULAR GLASS

A. Insulation: ASTM C552.
1. Maximum Thermal Conductivity 0.40 at 75 degrees F.
2. Maximum Water Vapor Transmission: 0.1 perm.

2.3CELLULAR FOAM

A. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.
1. Maximum Thermal Conductivity ASTM C177 or C518; 0.28 at 75 degrees F.
2. Minimum Service Temperature: -40 degrees F.
3. Maximum Service Temperature: 220 degrees F.
4. Maximum Moisture Absorbtion: ASTM D1056; 1.0 percent (pipe) by volume, 1.0 percent (sheet) by volume.
5. Moisture Vapor Transmission: ASTM E96; 0.20 perm inches.
6. Maximum Flame Spread: ASTM E84; 25.
7. Maximum Smoke Developed: ASTM E84; 50.
8. Connection: Waterproof vapor barrier adhesive.

B. Elastomeric Foam Adhesive
1. Air dried, contact adhesive, compatible with insulation.

2.4JACKETS

A. PVC Plastic
1. Jacket: ASTM C921, One piece molded type fitting covers and sheet material, off white color.
a) Minimum Service Temperature: -40 degrees F.
b) Maximum Service Temperature: 150 degrees F.
c) Moisture Vapor Transmission: ASTM E96; 0.002 perm inches.
d) Maximum Flame Spread: ASTM E84; 25.
e) Maximum Smoke Developed: ASTM E84; 50.
f) Thickness: 20 mil.
g) Connections: Brush on welding adhesive.

2. Covering Adhesive Mastic
a) Compatible with insulation.

B. Canvas Jacket: UL listed
1. Fabric: ASTM C921, 6 oz/sq yd, plain weave cotton treated with dilute fire retardant lagging adhesive.

2. Lagging Adhesive
   a) Compatible with insulation.

C. Aluminum Jacket: ASTM B209.
1. Thickness: 0.020 inch sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. On exposed piping, locate insulation and cover seams in least visible locations.

C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
1. Provide vapor barrier jackets, factory applied or field applied.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
3. Finish with glass cloth and vapor barrier adhesive.
4. PVC fitting covers may be used.
5. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
6. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. For insulated pipes conveying fluids above ambient temperature:
1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
3. Finish with glass cloth and adhesive.
4. PVC fitting covers may be used.
5. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
6. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

E. Inserts and Shields:
1. Application: Piping 2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert Location: Between support shield and piping and under the finish jacket.

4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: ASTM C640 cork, hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

F. Finish insulation at supports, protrusions, and interruptions.

G. For pipe exposed in mechanical equipment rooms or in finished spaces below 10 feet above finished floor, finish with canvas jacket sized for finish painting.

H. For exterior applications, provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

I. Cover all exterior refrigerant piping insulation with aluminum jacket with seams located on bottom side of horizontal piping.

3.3TOLERANCE

A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.4PIPING INSULATION THICKNESS

		Tube And Pipe Size (Inches)					
Service	Material	1/4-1	¼	1 1/2-3	3 1/2-5	6-10	11-36
Hot Domestic Water Supply and Recirculating Piping (Maximum 200°F)	Glass Fiber	1		1	1.5	1.5	1.5
	Cellular Glass		1.5	1.5	1.5	1.5	1.5
Cold Domestic Water Piping Above & below Ceilings	Glass Fiber	0.75		1	1	1	1
	Cellular Glass		1.5	1.5	1.5	1.5	1.5
	Flexible cellular		0.5	0.5	0.5	N/A	N/A
Refrigerant Piping (35°F nominal)	Flexible cellular		0.5	N/A	N/A	N/A	N/A
	Cellular Glass		1.5	1.5	1.5	1.5	1.5
A/C condensate Drain Located Inside Bldg.	Cellular Glass	1.5		1.5	1.5	1.5	1.5
	Flexible cellular		0.5	0.5	0.5	N/A	N/A

END OF SECTION

SECTION 152910 - DUCTWORK INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED FOR EACH ITEM)

A. Ductwork insulation.

B. Insulation jackets.

1.2 RELATED SECTIONS

A. Section 15010 - General Mechanical Requirements.

1.3 REFERENCES

A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
B. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
C. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
D. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.
E. ASTM E84 - Surface Burning Characteristics of Building Materials.
F. ASTM E96 - Water Vapor Transmission of Materials.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Product Data: Provide product description, list of materials and thickness for each service, and locations.

C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating shall not exceed 25/50 in accordance with ASTM E84.

1.6 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site according to the manufacturer's recommendations.

B. Deliver materials to site in original factory packaging, labeled with manufacturer's density and thickness.

C. Store insulation in original wrapping and protect from weather and construction traffic.

D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 GLASS FIBER, FLEXIBLE

A. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. Maximum Thermal Conductivity: ASTM C518, 0.29 at 75 degrees F.
   2. Maximum service temperature: 250 degrees F.
   3. Maximum moisture absorption: 5 percent by weight.

B. Vapor Barrier Jacket
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   2. Moisture vapor transmission: ASTM E96; 0.04 perm.
   3. Secure with pressure sensitive tape.

C. Vapor Barrier Tape
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

D. Tie Wire: Annealed steel, 16 gage.

2.2 GLASS FIBER, RIGID

A. Insulation: ASTM C612; rigid, noncombustible board.
   1. Maximum Thermal Conductivity: ASTM C518, 0.23 at 75 degrees F.
   2. Maximum service temperature: 250 degrees F.
   3. Maximum moisture absorption: 5 percent by weight.
   4. Density: 3.0 lb/cu ft.

B. Vapor Barrier Jacket
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   2. Moisture vapor transmission: ASTM E96; 0.04 perm.
   3. Secure with pressure sensitive tape.

C. Vapor Barrier Tape
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure

sensitive rubber based adhesive.

2.3JACKETS

A. Canvas Jacket: UL listed
   1. Fabric: 6 oz/sq yd, plain weave cotton treated with dilute fire retardant lagging adhesive.

   2. Lagging Adhesive
      a) Compatible with insulation.

PART 3 EXECUTION

3.1EXAMINATION

A. Verify that ductwork has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2INSTALLATION

A. Install materials in accordance with manufacturer's instructions. All insulation shall be installed on the exterior of ducts.

B. Insulated ductwork conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Insulated ductwork conveying air above ambient temperature:
   1. Provide with or without standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

D. For ductwork exposed in mechanical equipment rooms or in finished spaces below 10 feet above finished floor, finish with canvas jacket sized for finish painting.

E. For exterior applications, provide insulation with vapor barrier jacket. Cover with calked aluminum jacket with seams located on bottom side of horizontal duct section.

F. External Duct Insulation Application:
   1. Secure insulation with vapour barrier with wires and seal jacket joints with vapour barrier adhesive or tape to match jacket.
   2. Secure insulation without vapour barrier with staples, tape, or wires.
   3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
   4. Seal vapour barrier penetrations by mechanical fasteners with vapour barrier adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation

without disturbing wrapping.

3.3TOLERANCE

A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.4GLASS FIBER DUCTWORK INSULATION SCHEDULE

A. The insulation valve shall meet the energy code requirements or the following which ever is most stringent.

	THICKNESS Inch	DENSITY Lbs/Ft^3	TYPE
Supply and Return Ducts	2"	1.0	Flex
	1 1/2"	3.0	Rigid
Exhaust Ducts	1 1/2"	.75	Flex
	1"	3.0	Rigid
Outside Air Intake Duct	1 1/2"	.75	Flex
	1"	3.0	Rigid

END OF SECTION

SECTION 154480 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons using new materials.

END OF SECTION 15448

NEW DESTIN ELEMENTARY SCHOOL
OKALOOSA COUNTY SCHOOL DISTRICT
OKALOOSA COUNTY, FLORIDA

SECTION 15449 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

a. Servicing and adjustments of automatic faucets.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory: Wheelchair, vitreous china, wall mounted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

a. American Standard America.
b. Crane Plumbing, L.L.C.
c. Kohler Co.

2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.
b. Type: Slab or wheelchair for one bedroom quarter.
c. Nominal Size: Rectangular, 17 by 15 inches in one bedroom quarter.
d. Faucet-Hole Punching: Three holes, 2-inch centers.
e. Faucet-Hole Location: Top.
f. Color: White.
g. Mounting: For concealed-arm carrier.
h. Type: Standard for two bedroom quarter..
i. Nominal Size: Rectangular counter mounted 20 by 15 ½ inches for two bedroom quarter.

3. Faucet: Comply with requirement in “Solid-Brass, Manually Operated Faucets" Article.
4. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier with rectangular, steel uprights.

2.2 VITREOUS-CHINA, COUNTER-MOUNTED LAVATORIES

1. Lavatory; Oval, self-rimming, vitreous china, counter mounted

a. Standard: ASME A112.19.2/CSA B45.1.
b. Type: Self rimming for above counter mounting
c. Nominal Size: Oval, 20 by 17 inches in one bedroom quarter.
d. Faucet-Hole Punching: 4-inch centers.
e. Faucet-Hole Location: Top.
f. Color: White.

2.3 SOLID-BRASS, MANUALLY OPERATED FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets: Mechanically timed-type, single-control mixing, commercial grade, solid-brass valve.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

a. American Standard America.
b. Chicago Faucets.
c. Delta Faucet Company.
d. Kohler Co.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punching's; coordinate outlet with spout and fixture receptor.
4. Body Type: Single hole.
5. Body Material: Commercial, solid brass.
6. Finish: Polished chrome plate.
7. Maximum Flow Rate: 0.5 gpm.
8. Mounting Type: Deck, exposed, counter mounted.
9. Valve Handle(s): Single lever.
10. Spout: Rigid type.
11. Spout Outlet: Aerator.
12. Drain: Grid.

2.4 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle.

F. Risers:

1. NPS 3/8 and NPS 1/2.

2.5 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/4.
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings.

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories.

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 15449

SECTION 154500 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Mop Sink.
2. Classroom Sink
3. Sink Faucet and Bubbler
4. Supply fittings.
5. Waste fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sinks to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 MOP SINK

A. Mop Sink: Terrazzo, floor mounted.
1. Fixture:

a. Standard: IAPMO PS 99.

b. Shape: Square
c. Nominal Size: 24 by 24 inches
d. Height: 12 inches
e. Tiling Flange: Not required
f. Rim Guard: On all top surfaces.
g. Color: Not applicable
h. Drain: Grid with NPS 3 outlet.

2.2 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

B. Sink Faucets: Manual type, two-lever-handle mixing valve.

1. Commercial, Solid-Brass Faucets.
2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
4. Body Type: Centerset
5. Body Material: Commercial, solid brass
6. Finish: Chrome plated
7. Maximum Flow Rate: 2.2 gpm
8. Handle(s): Wrist blade, 4 inches
9. Mounting Type: Back/wall, exposed.
10. Spout Type: Rigid, solid brass with wall brace
11. Vacuum Breaker: Required for hose outlet.
12. Spout Outlet: Hose thread according to ASME B1.20.7

C. Classroom Sink: Stainless Steel, counter mounted.
1. Fixture:

a. Standard: ASME A112.18.1/CSA B125.1/NSF 61 & 372
b. Shape: Rectangular
c. Size: 25 by 17 inches
d. Height: 6-7/8 inches
e. Drain: 3-1/2 inches
f. Rim Guard: On all top surfaces

D. Sink faucet and Bubbler:

a. Standard: ASME A112.18.1/CSA B125.1/NSF 61 & 372
b. Faucet & Bubbler: Gooseneck w/bubbler
c. Type: Commercial Stainless Steel
d. Max Flow Rate: 1.5 gpm
e. Mounting Type: top exposed

2.3 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle

F. Risers:

1. NPS 1/2
2. Chrome-plated, rigid-copper pipe

2.4 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2
2. Material: Chrome-plated, two-piece, cast-brass trap and ground-joint swivel elbow with 0.032-inch- thick brass tube to wall and chrome-plated brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- thick stainless-steel tube to wall; and stainless-steel wall flange.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball or gate valves if supply stops are not specified with sink. Comply with valve requirements specified in Section “Ball Valves for Plumbing”.0
2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section "Escutcheons for Plumbing Piping."

G. Seal joints between sinks, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 161116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 161316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 15450

SECTION 154510 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves.

2. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

Characteristics: Nonshrink; recommended for interior and exterior applications.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Cut sleeves to length for mounting flush with both surfaces.

2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves.

2. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 6 Galvanized-steel wall sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves.

4. Interior Partitions:

a. Piping Smaller Than NPS 6 PVC-pipe sleeves.

END OF SECTION 15451

SECTION 154520 - BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 Annex G and NSF 372

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and soldered ends.
3. Set ball valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:
1. Handlever: For quarter-turn valves smaller than NPS 4.

H. Valves in Insulated Piping:

1. Include 2-inch stem extensions.

2.2 BRASS BALL VALVES

A. Two-Piece, Brass Ball Valves with Full Port and Brass Trim:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Forged brass.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

2.3 BRONZE BALL VALVES

A. Two-Piece, Bronze Ball Valves with Full Port, and Bronze or Brass Trim:

B.

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Bronze or brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

3.4 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE 150 PSIG OR LESS

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Two-piece, brass ball valves with full port and brass trim.
3. Two-piece, bronze ball valves with full port and bronze or brass trim.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Two-piece, brass ball valves with full port and brass trim.
3. Two-piece, bronze ball valves with full port and bronze or brass trim.

END OF SECTION 15452

SECTION 154530 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Block Insulation: ASTM C 552, Type I.
2. Special-Shaped Insulation: ASTM C 552, Type III.
3. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
4. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 SEALANTS

A. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.5 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section "Exterior Painting" and Section "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.6 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

4. Drainage piping located in plenum.

3.7 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. 2-Inch and Smaller: Insulation shall be the following:

a. Cellular Glass: 1-1/2 inches thick.

B. Domestic Hot and Recirculated Hot Water:

1. 3/4-Inch and Smaller: Insulation shall be the following:

a. Cellular Glass: 1-1/2 inches thick.

END OF SECTION 15453

SECTION 154540 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
2. Encasement for piping.
3. Specialty valves.
4. Flexible connectors.
5. Water meters furnished by utility company for installation by Contractor.
6. Water meters.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions.

1.4 SUBMITTALS

A. Product Data: For the following products:

1. Dielectric fittings.
2. Water meters.
3. Backflow preventers.

B. Water Samples: Specified in "Cleaning" Article.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.

C. Comply with NSF 61 for potable domestic water piping and components.

1.6 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
2. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L water tube, annealed temper.

1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2.3 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Form: Tube.

C. Material: LLDPE film of 0.008-inch minimum thickness.

D. Color: Black or Natural.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jomar International Ltd.
   b. Matco-Norca, Inc.
   c. McDonald, A. Y. Mfg. Co.
   d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   e. Wilkins; a Zurn company.

2. Description:

   a. Standard: ASSE 1079.
   b. Pressure Rating: 125 psig minimum at 180 deg F.
   c. End Connections: Solder-joint copper alloy and threaded ferrous.

2.6 WATER METERS

A. Turbine-Type Water Meters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AALIANT; a Venture Measurement Product Line.
   b. ABB.
   c. Badger Meter, Inc.
   d. Hays Fluid Controls.
   e. Master Meter, Inc.
   f. McCrometer.
   g. Mueller Company; Water Products Division.
   h. Schlumberger Limited; Water Division.
   i. SeaMetrics Inc.
   j. Sensus Metering Systems.

2. Description:

   a. Standard: AWWA C701.
   b. Pressure Rating: 150-psig working pressure.
   c. Body Design: Turbine; totalization meter.
   d. Registration: In gallons or cubic feet as required by utility company .
   e. Case: Bronze.
   f. End Connections for Meters NPS 2 and Smaller: Threaded.
   g. End Connections for Meters NPS 2-1/2 and Larger: Flanged.

B. Remote Registration System: Direct-reading type complying with AWWA C706; modified with signal transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance.

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

G. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

H. Install seismic restraints on piping.

I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

L. Install piping adjacent to equipment and specialties to allow service and maintenance.

M. Install piping to permit valve servicing.

N. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

O. Install piping free of sags and bends.

P. Install fittings for changes in direction and branch connections.

Q. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

R. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump.

S. Install sleeves for piping penetrations of walls, ceilings, and floors.

T. Install sleeve seals for piping penetrations of concrete walls and slabs.

U. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

E. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE INSTALLATION

A. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller.

B. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. NPS 1-1/2 and Smaller: Fitting-type coupling.

2. NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

3.6 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.

3.7 HANGER AND SUPPORT INSTALLATION

A. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.

2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.

3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

4. NPS 2-1/2: 108 inches with 1/2-inch rod.

B. Install supports for vertical copper tubing every 10 feet.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection.

3.9 IDENTIFICATION

A. Identify system components.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and

allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.11 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
7. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.12 CLEANING

A. Clean and disinfect potable and non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.13 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Under-building-slab, domestic water, building service piping, NPS 3 and smaller, shall be the following:

1. Soft copper tube, ASTM B 88, Type K.

D. Aboveground domestic water piping, NPS 2 and smaller, shall be the following:

1. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
2. Hard copper tube, ASTM B 88, Type L; copper solder-joint fittings; and soldered joints.

3.14 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller.
2. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 15454

SECTION 154550 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Backflow preventers.
   2. Wall hydrants.
   3. Outlet Boxes

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

   1. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers
   1. Standard: ASSE 1013.
   2. Operation: Continuous-pressure applications.
   3. Pressure Loss: 12 psig maximum, through middle third of flow range.
   4. Size: NPS 4 and NPS 2
   5. Body: Bronze for NPS 4 and NPS 2; steel with interior lining that complies with AWWA C550 or that is FDA approved
   6. End Connections: Threaded for NPS 4 and NPS 2
   7. Configuration: Designed for horizontal, straight-through flow.
   8. Accessories:

      a. Valves NPS 4 and NPS 2: Ball type with threaded ends on inlet and outlet.
      b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

2.4 OUTLET BOXES

A. Icemaker Outlet Boxes
   1. Mounting: Recessed.
   2. Material and Finish: Plastic box and faceplate.
   3. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
   4. Supply Shutoff Fitting: NPS 1/2 ball valve and NPS 1/2 copper, water tubing.

2.5 WALL HYDRANTS

A. Nonfreeze Wall Hydrants
   1. Standard: ASME A112.21.3M for concealed outlet, self-draining wall hydrants.
   2. Pressure Rating: 125 psig
   3. Operation: Loose key.
   4. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
   5. Inlet: NPS 3/4
   6. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
   7. Box: Deep, flush mounted with cover.
   8. Box and Cover Finish: Chrome plated
   9. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
   10. Nozzle and Wall-Plate Finish: Polished nickel bronze
   11. Operating Keys(s): Two with each wall hydrant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

3.2 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Reduced-pressure-principle backflow preventers.
2. Outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 15455

SECTION 154560 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

D. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers"

2.3 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Charlotte Pipe and Foundry Company

2) Fernco Inc.
3) Spears Plastic Pipe, Fittings, and Valves

b. Standard: ASTM C 1173.
c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
d. Sleeve Materials:

1) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Cascade Waterworks Mfg. Co.
2) Huskey Tehnologies
3) Mission Rubber Company; a division of MCP Industries, Inc.

b. Standard: ASTM C 1460.
c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping.

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install aboveground PVC piping according to ASTM D 2665.

O. Install underground PVC piping according to ASTM D 2321.

P. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping.

Q. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

R. Install sleeves for piping penetrations of walls, ceilings, and floors.

S. Install sleeve seals for piping penetrations of concrete walls and slabs.

T. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

A. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices.

B. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.

2. NPS 3: 48 inches with 1/2-inch rod.

3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

C. Install supports for vertical PVC piping every 48 inches.

D. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.6 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.9 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

C. Aboveground, vent piping NPS 4 and smaller shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be the following:

1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

END OF SECTION 15456

SECTION 154570 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Commercial, electric, storage, domestic-water heaters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

   1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of commercial electric, domestic-water heater, from manufacturer.

B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

C. Source quality-control reports.

D. Field quality-control reports.

E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Commercial, Electric, Storage, Domestic-Water Heaters:

1) Storage Tank Five years.
2) Controls and Other Components: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Domestic-Water Booster Heaters:
1. Standard: UL 1453.
2. Tank Construction: steel.

a. Tappings: ASME B1.20.1 pipe thread.

b. Pressure Rating: 150 psig
c. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending lining material into tappings.

3. Factory-Installed Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
c. Insulation: Comply with ASHRAE/IESNA 90.1.
d. Jacket: Rectangular shaped, with stainless-steel front panel, unless otherwise indicated.
e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.

1) Option: Booster heaters with total of 9 kW or less may have two or three elements.

f. Temperature Control: Adjustable thermostat, to setting of at least 180 deg F
g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
h. Relief Valve: ASME rated and stamped for combination temperature-and-pressure relief valve. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
i. Gages: Combination temperature-and-pressure type or separate thermometer and pressure gage.

B. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

2.2 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base.

B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping.

C. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains.

E. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

F. Fill electric, domestic-water heaters with water.

G. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 15457

SECTION 154580 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

A. Water Closets Floor mounted, bottom outlet, top spud.
1. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: Handicapped/elderly, complying with ICC/ANSI A117.1.
f. Rim Contour: Elongated.
g. Water Consumption: 1.28 gal. per flush.
h. Spud Size and Location: NPS 1-1/2 ; top.
i. Color: White.

2. Bowl-to-Drain Connecting Fitting: ASME A112.4.3.
3. Flushometer Valve: on wide side.
4. Toilet Seat:

2.2 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves on wide side:

1. Standard: ASSE 1037.
2. Minimum Pressure Rating: 125 psig.
3. Features: Include integral check stop and backflow-prevention device.
4. Material: Brass body with corrosion-resistant components.
5. Exposed Flushometer-Valve Finish: Chrome plated.
6. Panel Finish: Chrome plated or stainless steel.
7. Style: Exposed.
8. Consumption: 1.28 gal. per flush.
9. Minimum Inlet: NPS 1.
10. Minimum Outlet: NPS 1-1/4.

2.3 TOILET SEATS

A. Toilet Seats:
1. Standard: IAPMO/ANSI Z124.5.
2. Material: Plastic.
3. Type: Commercial (Heavy duty).
4. Shape: Elongated rim, open front.
5. Hinge: Check.
6. Hinge Material: Noncorroding metal.
7. Seat Cover: Not required.
8. Color: .White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.

B. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.

C. Install toilet seats on water closets.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.

E. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 15458

SECTION 154590 - DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes drinking fountains and related components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of drinking fountain.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

A. Drinking Fountains: Stainless steel, wall mounted for ADA.
1. Stainless-Steel Drinking Fountains:
2. Standards:
    a. Comply with NSF 61 Annex G.
    b. ADA & ICC A117.1
    c. ASME A112.19.3/CSA B45.4
    d. Buy America Act
3. Type Receptor: With back.
4. Receptor Shape: Rectangular.
5. Back Panel: Stainless-steel wall plate behind drinking fountain.
6. Bubblers: One, with adjustable stream regulator, located on deck, Vandal resistant.

7. Control: Push button.
8. Drain: Grid type with NPS 1-1/4 tailpiece.
9. Supply: NPS 3/8 with shutoff valve.
10. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 chrome-plated brass P-trap and waste.
11. Support: ASME A112.6.1M, Type III lavatory carrier.
12. Installation: Indoor & Outdoor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.

B. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

C. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping."

D. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

E. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings.

F. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 15459

SECTION 156720 - AIR COOLED HEAT PUMP UNIT

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED FOR EACH ITEM)

A. Heat pump unit.

B. Refrigerant piping.

1.2 RELATED SECTIONS

A. Section 15010 - General Mechanical Requirements.

1.3 REFERENCES

A. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

B. ANSI/UL 207 - Refrigerant-Containing Components and Accessories, Non-Electrical.

C. ANSI/UL 303 - Refrigeration and Air-Conditioning Condensing, and Air-Source Heat Pump Equipment.

D. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

E. ARI 360 - Commercial and Industrial Unitary Air-Conditioning Equipment.

F. ASHRAE 14 - Methods of Testing for Rating Positive Displacement Condensing Units.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Submit shop drawings indicating components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections.

C. Submit schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system. The layout shall show sizes, traps, valves and other items of the system. The layout shall be approved by the equipment manufacturer.

D. Submit product data indicating rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams.

E. Submit manufacturer's installation instructions.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 15010.

B. Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units on site from physical damage. Protect coils.

1.7 WARRANTY

A. Provide five year compressor warranty.

PART 2 PRODUCTS

2.1 HEAT PUMP UNIT

A. Construction and Ratings: In accordance with ARI 210/240 or 360, and ANSI/UL 207 and ANSI/UL 303. Testing shall be in accordance with ASHRAE 14.

2.2 HEAT PUMP OUTDOOR SECTION

A. Each unit shall be completely factory assembled, wired, and tested.

B. Condenser coil shall be copper or aluminum tube, as standard with the manufacturer; aluminum fin mechanically bonded. Minimum tube size to be 1/2" O.D.

C. Condenser fan shall be propeller type, vertical discharge with vinyl coated fan guard. Fan shall be electronically balanced to eliminate vibration and noise. Fan motor shall be direct drive, inherently protected with sealed ball bearings. Unit shall operate in ambient temperature as low as 30 degrees F with condenser fan cycling.

D. Compressors shall be designed for heat pump use. Compressors shall be sealed hermetic type, with external vibration isolating mounts, and shall have crankcase heaters to prevent oil dilution. Compressor section to contain filter dryer and accumulator. Compressors shall have factory mounted suction and discharge line service valves.

E. Controls shall be factory mounted and wired in an accessible enclosure within the compressor compartment. System shall have a fully automatic defrost cycle and timer to prevent the compressor from short cycling. Safety controls shall consist of high-low pressure cut-out and compressor overload protection. Cabinet shall be the manufacturer's standard of quality in appearance and construction. Cabinet shall be a minimum of zinc coated sheet metal and finished with epoxy paint. Compressor section shall have a large access panel for ease of service.

F. Units shall have capacities as per schedule on drawings. The efficiency performance shall meet the requirements of heat pump unit schedule on the drawings. Units shall be UL listed and ARI rated.

2.3 HEAT PUMP INDOOR SECTION

A. Each unit shall be completely factory assembled with insulated metal cabinet, direct expansion coil, insulated drain pan, fan and filter section complete with tool less access and disposable filters. Units shall be designed for vertical or horizontal mounting as shown on the plans.

B. Evaporator coil shall be direct expansion, refrigerant 410A, copper tube aluminum fin mechanically bonded. Thermal expansion valves shall have bypass line and check valve installed for heat pump use. Minimum tube size 1/2" O.D.

C. Evaporator fan shall be forward curved double inlet mounted on a common shaft with permanently lubricated ball bearings. Fan shall be statically and dynamically balanced for smooth operation. Fans shall be 3-speed, direct drive, ECM, or shall be "V" belt driven if standard for larger sizes, provide adjustable motor pulley. Fan shall have vibration isolation.

D. Cabinet shall be constructed of hot dip galvanized sheet steel with a minimum thickness of 18 gauge. Interior panels and top shall be covered with insulation to prevent heat gain and noise transmission. Provide factory or shop fabricated insulated metal base for each unit, unless shown otherwise, to match cabinet of unit furnished. If base is not available from the equipment manufacturer the Contractor shall provide a base constructed of galvanized structural angle iron frame with minimum 18 gauge panels. Paint to match unit furnished. Provide permanent air seal gasket between top of base and the unit and between base and floor. Provide factory furnished filter section with tool less access and sectional throwaway filters. Submit metal base shop drawings if shop fabricated.

E. Filter to be of standard size throwaway and not less than 2" thick. Filter section shall be accessible from front of unit.

F. The drain pans shall be sloped in two directions to insure 100% drainage. The pans shall be plastic or stainless steel and insulated.

G. The insulation shall be provided with foil facing or coating on air side.

H. Units shall have capacity as per schedule on drawings. Units shall be UL listed and ARI rated. Submit the product data at the conditions scheduled.

I. Electric heaters shall be UL listed and factory installed for timed defrost control. Electric heaters shall be factory installed and shall be furnished complete with air limiting and safety devices as required by National Electrical Code. Units shall bear UL approval for use in indoor unit. Units shall be provided with defrost control by timer.

2.4REFRIGERANT PIPING

A. Materials to be Type K copper, ASTM B 280 and shall be mill cleaned, dried and capped, or may be equipment manufacturers precharged piping installed to fully conform with the equipment manufacturers recommendations.

B. Fittings shall be wrought copper and joints shall be soldered using a high content silver alloy solder. Extra heavy fittings must be used.

C. Installation shall be in accordance with unit manufacturer's and ANSI requirements with all piping

secured to walls and ceilings with approved galvanized hangers.

D. Test refrigerant system at 500 PSI before charging system. System is to be thoroughly purged and evacuated before charging with refrigerant 410A in accordance with manufacturer's recommendations.

2.5 CONTROLS

A. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer. For each condenser fan, provide across-the-line starter with starter relay and relays and controls required to operate as indicated in the sequence of operation.

B. Provide the following safety controls arranged so that operating any one will shut down machine.

1. High discharge pressure switch (manual reset).

2. Low suction pressure switch (automatic reset).

3. Current overload protection (manual reset).

4. Condensate Overflow (automatic reset).

C. The heat pump shall have a 7 day programmable thermostat.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install refrigeration piping according to ANSI/ASME B31.5.

C. Install outdoor units on pads which extend 6" pass unit on all 4 sides.

D. Install in accordance with ANSI/ASHRAE 15.

E. Install cooling units so the condensate traps have proper clearance based on static pressure of the units.

3.2 MANUFACTURER'S FIELD SERVICES

A. Provide initial start-up, including first year routine servicing and check out.

END OF SECTION

SECTION 157870 - DUCTLESS SPLIT SYSTEM AIR CONDITIONING UNIT

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED FOR EACH ITEM)

A. Air Conditioning Units.

B. Controls.

1.2 RELATED SECTIONS

A. Section 15010 - General Mechanical Requirements.

1.3 REFERENCES

A. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

A. Section 15010: Procedures for submittals.

B. Product Data: Provide manufacturers literature and data indicating water, drain, and electrical characteristics and connection requirements.

C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.7 WARRANTY

A. Provide one year warranty on compressor.

PART 2 PRODUCTS

2.1 APPROVAL

A. The unit shall be UL listed.

2.2 AIR CONDITIONING UNIT

A. Description: Split system air cooled heat pump, factory assembled, pre-wired and consisting of cabinet, fan, filters, controls.

B. Assembly: For wall mounting of indoor unit.

C. Cabinet: Welded steel with baked enamel finish, and lined with 1/2 inch thick acoustic duct liner.

D. Evaporator Fan: Forward curved centrifugal, directly driven.

E. Compressor: Hermetic with resilient suspension system, oil strainer, internal motor overload protection, low pressure switch, manual reset high pressure switch.

F. Evaporator Coil: Direct expansion cooling coil of seamless copper tubes expanded into aluminum fins, with thermal expansion valve with external equalizer, liquid line filter-drier, service shut-off valves and charging valves.

G. Air Cooled Condenser: Integral copper tube aluminum fin coil sized for rated capacity at 95 degrees F with fan driven by evaporator fan motor.

H. Filter: One inch thick disposable glass fiber media.

I. Heating Coils: Nichrome wire electric elements with contactor, dehumidification relay, and high temperature limit switch.

2.3CONTROL SYSTEM

A. Unit Mounted: Main fan contactor, compressor and condenser fan contactor, compressor start capacitor, controls transformer with circuit breaker, temperature control module, time delay relay, heat contactor, and high temperature thermostat.

PART 3 EXECUTION

3.1INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide all supports as required for mounting unit.

C. Provide adequate drainage connections for unit condensate.

3.2MANUFACTURER'S FIELD SERVICES

A. Prepare and start system and set initial temperature set points. Instruct operating personnel.

END OF SECTION

SECTION 158550 - AIR HANDLING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED FOR EACH ITEM)

A. Air handling units.

B. Filter sections.

1.2 RELATED SECTIONS

A. Section 15010 - Mechanical General Requirements.

1.3 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.

C. Product Data:
1. Provide literature which indicates dimensions, weights, capacities, ratings, fan performance, gages and finishes of materials, and electrical characteristics and connection requirements.
2. Provide data of filter media, filter performance data, filter assembly, and filter frames.
3. Provide fan curves with specified operating point clearly plotted.
4. Submit sound power level data for fan outlet at rated capacity.
5. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
6. Vibration isolation documentation.

D. Manufacturer's Installation Instructions.

1.4 REFERENCES

A. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.

B. AMCA 300 - Test Code for Sound Rating Air Moving Devices.

C. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.

D. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.

E. ARI 430 - Central-Station Air-Handling Units.

F. ARI 435 - Application of Central-Station Air-Handling Units.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 15010.

B. Maintenance Data: Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience, who issues complete catalog data on total product.

B. Air Handling Units: Certify capacity, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430.

C. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with ARI 410.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products according to the manufacturer's recommendations.

B. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.

C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.8 START-UP REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.9 EXTRA MATERIALS

A. Provide one set of filters for each unit.

PART 2 PRODUCTS

2.1 GENERAL DESCRIPTION

A. Fabricated blow/draw-through type air handling units as indicated suitable for the scheduled air pressure operation.

B. Fabricate units with fan section, coil section, and filter section.

C. Factory fabricate and test air handling units of sizes, capacities, and configuration as indicated and specified. On units not shipped fully assembled, manufacturer shall tag each section to indicate location in direction of airflow to facilitate assembly at the job site.

2.2 CASING

A. Unit shall be double wall constructed in all sections. Exterior wall shall be minimum 18 gauge G-90 galvanized steel. Interior wall shall be minimum 20 gauge G-90 galvanized steel. All portions of the interior of the unit exposed to the airstream shall be covered with steel to prevent fiberglass erosion into the airstream. Foil facing on insulation shall not be acceptable as a substitute for double wall construction. If casing sections are not provided by the unit manufacturer with double wall construction the contractor shall be responsible for covering exposed insulation with galvanized steel. Unit shall be designed and constructed such that all exterior panels are non-load bearing. Removal of all exterior panels shall not affect the structural integrity of the unit. Units with welds on exterior surfaces or welds that have burned through from interior welds shall also receive a final shop coat of zinc-rich protective paint in manufacturer's standard color. All panels shall be gasketed and meet UL 723 for surface burning characteristics.

B. Insulate all sections handling conditioned air with 2" thick 1 ½ lb. uncompressed fiberglass sandwiched between two sheets of galvanized steel. Fiberglass insulation shall not be exposed to the airstream. If any insulation is exposed, the contractor shall be responsible for covering it with galvanized steel. The insulation shall be glued to prevent sagging after prolonged use. The Contractor shall be responsible for gluing the insulation if not done at factory.

C. As required for routine service access, unit shall be supplied with full height, galvanized, double wall, hinged, removable access doors. Access door shall have a full perimeter automotive type gasket to prevent air leakage, and handles that can be opened from unit interior. The hinges shall be stainless steel from the factory or field installed. Provide a single access door in the fan section and access doors on both sides of the filter section. Removable panels shall be acceptable as access for both sides of the coil sections. Removable panels shall be constructed of frame channel cabinet construction, which isolates the inner liner from the external liner. If this type of construction is not available, access doors shall be provided.

D. Units shall have internally mounted and isolated motors and drives and shall be provided with a full size removable service door on the side which has clearance for access.

E. The drain pan shall extend under the complete coil section. Drain connections shall be provided on the side as required. All drain pans shall be of sealed double wall construction with stainless inside and galvanized outside steel construction with the manufacturer's standard insulation sandwiched between the pan layers. The insulation thickness shall be a minimum of 2" thick uncompressed or additional insulation shall be added to the exterior of unit to maintain the insulation requirement. Drain pans shall be sloped in 2 planes; cross break interior, and pitch toward drain connection to ensure complete condensate drainage.

F. Provide a full length base rail under each unit, 6” minimum or as scheduled.

2.3FANS

A. Provide supply fan section with forward curved double width, double inlet centrifugal fan designed and suitable for class of service indicated in the unit schedule. Fan shaft to be properly sized and protectively coated with lubricating oil. Fan shafts shall be solid and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. Fans shall be statically and dynamically tested as an assembly at the required RPM to meet design specifications. Fan wheel shall be properly secured to shaft to prevent slippage.

B. Provide self-aligning, grease lubricated pillow-block ball bearings with lubrication fittings. Provide extended grease lines to drive side of unit casing, for all fan bearings, rigidly attached for easy service access. All bearings shall perform to L-50 200,000 hour average life.

C. The performance rating shall conform to AMCA 210 and the sound rating to AMCA 301. Test to AMCA 300 and bear the AMCA seals.

2.4MOTORS AND DRIVES

A. Fan motors to be mounted and isolated on the same integral base as the fan. The motors shall be on an adjustable slide base.

B. Fan motors shall be heavy duty, high efficiency open drip-proof. Provide with starters and control wiring.

C. V-Belt drive shall be cast iron or steel sheaves, dynamically balanced, bored to fit shafts, and keyed. Fixed sheaves, with matched belts and drive rated as recommended by manufacturer shall be provided for variable volume systems that utilize a variable speed starter to control the fan speed. Variable and adjustable pitch sheaves with matched belts shall be selected so the required rpm is obtained with sheaves set at mid-point when utilized on constant volume systems. V-belt drive shall be rated at 1.5 times the motor nameplate.

D. The units shall be provided with UL listed starters sized for the unit. The starters shall have a HOA switch and auxiliary contacts as required for interlocks and controls.

2.5COILS

A. Coils shall be manufactured by the same company as the supplier of the air handling unit. Coils shall be designed with aluminum plate fins and copper tubes.

A. Coils shall be manufactured by the same company as the supplier of the air handling unit. Coils shall be designed with aluminum plate fins and copper tubes.

B. Fins shall have collars drawn, belled and firmly bonded to the tubes by means of mechanical expansion of the tubes. No soldering or tinning shall be used in the bonding process. Coils shall be mounted in the unit casing to be accessible for service and can be removed from the unit either through the side or top. Capacities, pressure drops and selection procedure shall be certified in accordance with ARI Standard 410.

C. Provide factory installed extended drain and vent connections for water coils. The drain and

vents shall extend through the unit cabinetry.

C. Provide factory installed extended drain and vent connections for water coils. The drain and vents shall extend through the unit cabinetry.

1. All coils shall be enclosed in an insulated coil exposed.
2. Water flow shall be counter to airflow.
3. Coils shall be proof tested to 300 psig and leak tested to 200 psig air pressure under water.
4. Headers shall be round copper pipe or cast iron. Steel pipe headers are not acceptable

2.6FILTERS

A. Provide factory fabricated filter section of the same construction and finish as unit casing with filter guides and hinged, removable double wall access doors with automotive style gasket for minimum leakage for filter removal. Filter boxes shall be fabricated to flange to other unit components. Blockoffs shall be provided by the unit manufacturer as required to provent air bypass around filters. The units shall be provided with disposable extended area panel filters, UL 900 Class 2 with MERV rating of 13. The filters shall be a standard size and 2” thick.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s instructions

B. Mount each unit on a 4” high concrete housekeeping pad

C. Install in conformance with ARI 435.

D. Replace filters installed during construction with clean filters when construction is complete and before air balancing takes place.

E. Charge extended lube lines with grease from the bearings to the lube fittings.

END OF SECTION

SECTION 158700 – POWER VENTILATORS

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED ON EACH ITEM)

A. Roof exhaust fan.
B. Cabinet exhaust fans.
C. Ceiling exhaust fans.
F. Roof curbs.

1.2 RELATED SECTIONS

A. Section 15010 - General Mechanical Requirements

1.3 REFERENCES

A. AMCA 99 - Standards Handbook.

B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.

C. AMCA 261 - Directory of Products Licensed to Bear the AMCA Certified Ratings Seal.

D. AMCA 300 - Test Code for Sound Rating Air Moving Devices.

E. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.

F. NEMA MG1 - Motors and Generators.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 15010.

B. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

PART 2 PRODUCTS

2.1GENERAL

A. All products shall be UL listed.

2.2ROOF EXHAUST FAN

A. Roof exhaust fan shall be upblast centrifugal direct drive type. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced. The fan housing shall be constructed of aluminum with a rigid internal support structure. Windbands shall have a rolled bead for added strength and shall be joined to curbcaps with a leakproof, continuously welded seam. Motors shall be mounted out of the airstream on vibration isolators. Fresh air for motor cooling shall be drawn into the motor compartment from an area free of discharge contaminants. Motors shall be readily accessible for maintenance. A disconnect switch shall be factory installed and wired from the fan motor to a junction box within the motor compartment. A conduit chase shall be provided through the curb cap to the motor compartment for ease of electrical wiring. All fans shall bear the AMCA Certified Ratings Seal for sound and air performance. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

2.3CABINET EXHAUST FANS

A. Duct mounted, exhaust fans shall be of the centrifugal, belt driven in-line type. The fan housing shall be of the rectangular design constructed of heavy gauge galvanized steel and shall include rectangular duct mounting collars. A hinged or removable panel shall be provided in the fan cabinet of sufficient size to permit access for service to all of the fan's internal components without dismantling the cabinet. The fan wheel shall be of the galvanized steel, forward curved, centrifugal type. Wheels shall be dynamically and statically balanced. Motors shall be of the heavy duty type with permanently sealed ball bearings. The wheel shaft shall be ground and polished steel mounted in permanently sealed pillow block bearings. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the machined cast iron type, keyed and securely attached to the wheel and motor pulleys shall be adjustable for final system balancing. All fans shall bear the AMCA certified ratings seal for air performance. The fans shall have backdraft dampers and have base or hanging spring vibration isolation as the application requires. The housings shall be insulated.

2.4CEILING EXHAUST FANS

A. Ceiling mounted exhaust fans shall be of the centrifugal direct drive type. The fan housing shall be constructed of heavy gauge galvanized steel with prepunched mounting brackets. The housing interior shall be lined with 1/2" acoustical fiberglass insulation. The outlet duct collar shall include an aluminum backdraft damper and shall be adaptable for horizontal or vertical discharge. The access for wiring shall be external. The motor disconnect shall be internal and of the plug in type. The motor shall be mounted on vibration isolators. The fan wheel(s) shall be of the forward curved centrifugal type, constructed of galvanized steel and dynamically balanced. The fans shall have integral aluminum ceiling grille. The fans shall be ducted as shown on drawings. Provide ductwork factory fabricated wall or roof cap. Fans shall have capacities as scheduled on drawings and shall be controlled as indicated. Provide with

electronic speed control.

2.7ROOF CURBS

A. Roof curbs shall be factory fabricated with sheet-metal structural members complying with the National Roofing Contractors Association (NRCA) requirements. The roof curbs shall be of approved by the roofing manufacture for this type of installation and meet the vibration isolation requirements specified.

2.8BACKDRAFT DAMPERS

A. The backdraft dampers shall be gravity actuated, aluminum multiple blade construction with nylon bearings.

PART 3 EXECUTION

3.1INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install flexible connections between fan inlet and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

C. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

D. Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 158910 - DUCTWORK

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED FOR EACH ITEM)

A. Insulated flexible ducts.

B. Galvanized steel duct material.

C. Duct sealer.

1.2 RELATED SECTIONS

A. Section 15010 - General Mechanical Requirements

1.3 REFERENCES

A. ASTM A 36 - Structural Steel.

B. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.

D. ASTM A 525 - General Requirements for Steel Sheet, Zinc- Coated (Galvanized) by the Hot-Dip Process.

E. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.

F. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

G. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.

I. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Manufacturer's catalog data showing that ratings, capacities, weights, etc. meet specification.

C. Manufacturer's Installation Instructions: Indicate procedures for duct installation.

1.5 PERFORMANCE REQUIREMENTS

A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.6 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 15010.

B. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

B. Maintain one copy of document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing the work of this section with minimum five years documented experience.

1.9 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A and NFPA 90B standards.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures during and after installation of duct sealants.

PART 2 PRODUCTS

2.1 MATERIALS

A. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality, having G90 zinc coating of in conformance with ASTM A90.

B. Insulated Flexible Ducts:

1. The insulated flexible duct shall meet UL 181 Class 1.

2. Multiple layers of aluminized duct fabric supported by helically wound spring steel wire; fiberglass insulation; aluminized vapor barrier film and the thermal conductive shall not be more than .23.

3. Pressure Rating: 6 inches WG positive and 1.0 inches negative.

4. Maximum Velocity: 4000 fpm.

5. Temperature Range: -20 degrees F to 210 degrees F.

C. Fasteners: Rivets, bolts, or sheet metal screws.

D. Sealant:

1. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

E. Hanger Rod: ASTM A36; galvanized steel, threaded both ends, threaded one end, or continuously threaded.

2.2 DUCTWORK - LOW PRESSURE

A. This part of the specification shall apply to all low pressure rectangular shop fabricated ductwork for all supply air distribution systems, return air systems, outside air systems and exhaust systems. Ductwork shall be constructed of galvanized steel sheets, furnished and installed in sizes as indicated and located where shown on the drawings. This part of the work shall include all ductwork, manual dampers, access panels, louvers, etc., with all accessories to make a complete air distribution system. Noise, vibration or drumming of air in ductwork, noises at air outlets or returns, excessive air leaks, malfunctioning of dampers, etc., will be cause for rejecting affected parts of the ductwork.

The Mechanical Contractor shall coordinate with the General Contractor all ductwork penetrations of walls which require lintels or sleeves.

B. The following weights of materials, types of joints and bracing shall be followed for sheetmetal ductwork.

Steel US Maximum Type of Transverse Bracing

Std. Gauge	Inches	Joint Conn.	
24	Up to 12	S-Drive, pocket or bar clips, on 7" - 10" centers	None
24	13 to 24	S-Drive, pocket or bar clips, on 7" - 10" centers	None
24	25 to 30	A-Drive, pocket or bar clips, on angle 7"-10" centers	1x1x1/8"
20	30 and Greater	S-Drive, pocket or clips, on angle 7"-10" centers	1x1x1/8"

C. The following details of duct construction shall be adhered to without deviation:

1. Longitudinal seams for metal shall be Pittsburgh lock.

2. Sweep elbows shall be made with inside radius equal to width of ducts, except as shown on the drawings. Square elbows must be provided with approved turning vanes to assure good air flow to outlets.

3. Provide vanes at all elbows. Provide adjustable splitter dampers and turning vanes at duct tees.

4. Horizontal ducts shall be hung at intervals not exceeding 8'-0" with 18-gauge galvanized iron hangers extending the full height of the duct.

5. Shop drawings of all ductwork shall be submitted when for any reason there are differences from contract drawings for approval.

6. All ductwork shall be fabricated in strict accordance with SMACNA Construction Standards for Low Velocity Ductwork unless more stringent requirements are called for in the specifications. All seams shall be caulked or taped to prevent air leakage for all pressure duct classifications.

D. 45 degree shoe fittings shall be provided at all rectangular or square branch connections to main headers in accordance with SMACNA Standards. Provide manual volume damper if branch duct serves two or more air devices.

2.3DUCTWORK - DUAL WALL SPIRAL

A. This part of the specification shall apply to all double wall round ductwork used in heating and air conditioning systems for air delivery to the spaces where noted on the drawings. Ductwork

shall be constructed of galvanized steel, furnished and installed in sizes as indicated and located where shown on the drawings. This part of the work shall include all ductwork, fittings, transitions, etc., with all accessories to make a complete system. Noise, vibration or drumming of air in ductwork, air leaks, etc., will be cause for rejecting affected parts of the ductwork. Duct sizes shown on the plans are internal. The ductwork shall have the galvanized finish which can be painted.

1. Where dual wall ductwork is required all round duct shall be spiral lockseam construction with matching fittings. The spiral lockseam duct shall be of standard construction for the outer pressure shell with the inner solid liner being of the construction in gauges according to the table below. The matching fittings shall be with metal gauges according to the table below.

ROUND DUCT		
DIAMETER	OUTER WALL GAUGE	LINER GAUGE
3"-12"	26	26
13"-24"	24	28
26"-34"	22	28
36"-48"	20	26
50"-	18	26
ROUND FITTINGS		
DIAMETER	OUTER WALL GAUGE	LINER GAUGE
3"-26"	22	24
28"-36"	20	24
38"-50"	20	22
52"-60"	18	20
62"-	16	20

2. All duct and fittings shall be manufactured from galvanized steel of Lockforming Quality (LFQ) per ASTM A-527. The zinc coating shall be minimum G-90 (1.25 Oz. per sq. ft.) per ASTM A-525.

3. Insulation shall be 1" thick, with K value - .27, flame spread - 25 (ASTM E84-80), and smoke developed - 25.

4. All elbows shall have a center-line radius equal to 1.5 times the duct diameter, and be constructed of gores; 2 piece for 0-30 degrees, 3 piece for 31 degrees – 75 degrees and 5 piece for 78 degrees – 90 degrees. Seams on fittings shall be continuously welded; either resistance or bronze wire.

5. Branches off main duct runs can be either Saddle Taps factory mounted to the duct wall (manifold) or individual fittings. Substitutions of sizes by cross-sectional area or equivalent round formulas must have prior written approval.

6. Hangers shall be a maximum of 12'-0" on center for round sections.

7. The spiral duct and fittings are to be furnished by a single manufacturer experienced and equipped for that purpose.

2.4DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated or specified whichever is the most stringent. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where rectangular elbows are used, provide turning vanes.

C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

D. Fabricate continuously welded round fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

E. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

PART 3 EXECUTION

3.1INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible unless more stringent items are required by specifications. All ducts are to be sealed.

C. Duct Sizes are inside clear dimensions. All duct joints shall be sealed with tape or mastic for all pressure classes.

D. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation so that it can be removed and replaced.

E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

G. Use double nuts and lock washers on threaded rod supports.

H. Hanger straps shall be used to support the flexible ductwork. These straps shall be of galvanized sheet metal or aluminum, shall be 4" wide, and have smooth edges to prevent puncturing exterior wrap insulation. Hanger straps may be suspended with wire from building structure. Install flexible ductwork supports at center of flex duct.

I. The flex duct shall be a maximum of 8' long.

J. During on site storage construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.2 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning. The duct systems may be cleaned with high power vacuum machines.

3.3 SCHEDULES

A. DUCTWORK MATERIAL SCHEDULE

AIR SYSTEM	MATERIAL
Supply	Steel
Return	Steel
General Exhaust	Steel
Outside Air	Steel

B. DUCTWORK PRESSURE CLASS SCHEDULE

AIR SYSTEM	PRESSURE CLASS
Supply	1 inch
Return	1 inch
General Exhaust	1 inch
Outside Air Intake	1 inch

END OF SECTION

SECTION 159100 - DUCTWORK ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTAL REQUIRED FOR EACH ITEM)

A. Air turning devices.

B. Backdraft dampers.

C. Duct access doors.

D. Flexible duct connections.

E. Volume control dampers.

1.2 RELATED SECTIONS

A. Section 15010 - General Mechanical Requirements

1.3 REFERENCES

A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

B. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers duct access doors and duct test holes.

C. Product Data: Provide for shop fabricated assemblies including volume control dampers duct access doors duct test holes and hardware used.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 15010.

B. Record actual locations of access doors.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products according to good construction practices.

1.8EXTRA MATERIALS

A. Furnish under provisions of Section 15010.

PART 2 PRODUCTS

2.1AIR TURNING DEVICES

A. The turning vanes shall be per SMANCA single thickness.

2.2DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover. Door to have continuous piano hinge.

1. Less Than 12 Inches Square: Secure with cam locks.

2. Up to 18 Inches Square: Provide two cam locks.

3. Up to 24 x 48 Inches: Three latches.

B. Access doors with sheet metal screw fasteners are not acceptable.

C. In locations where space is limited the hinge may be deleted and cam locks provided on each side of door. Provide two cam locks on each side for doors with sides over 18" long.

2.3DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.5FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Connector: Fabric crimped into metal edging strip.

1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.

2. Net Fabric Width: Approximately 2 inches wide.

3. Metal: 3 inch wide, 24 gage thick galvanized steel.

2.6VOLUME CONTROL DAMPERS.

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Splitter Dampers:

1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.

2. Blade: Fabricate of double thickness sheet metal to streamline shape, secured with continuous hinge or rod.

3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.

C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble, center and edge crimp blades in prime coated or galvanized channel frame with suitable hardware.

D. End Bearings: Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or bronze bearings.

E. Quadrants:

1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters so the dampers can be adjusted without disturbing the insulation.

3. Where rod lengths exceed 30 inches provide regulator at both ends.

G. Spin Ins: The spin-ins shall have scoop with adjustable manual volume damper. The damper shall have lockable quadrant with stand off to clear insulation.

PART 3 EXECUTION

3.1INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to "Ductwork" Section for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after automatic dampers, at fire dampers, and elsewhere as indicated. Review locations prior to fabrication. The access doors shall be the following minimum sizes.

Duct Diameter	Access Opening
8" thru 10"	7" dia.
11" thru 13"	10" dia.
14" thru 19"	13" dia.
20" and over	14" dia.

D. For rectangular ducts, the nominal size of the access opening shall be:

Duct Size	Access Opening
8" thru 16"	8" X 12"
17" thru 24"	12" X 12"
25" and over	18" X 18"

E. Provide duct test holes where as required for testing and balancing purposes.

F. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

G. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 159400 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SECTION INCLUDES (SUBMITTALS REQUIRED FOR EACH ITEM)

A. Supply registers.

B. Return registers.

C. Return grilles.

D. Louvers.

1.2 RELATED SECTIONS

A. Section 15010 - General Mechanical Requirements

1.3 REFERENCES

A. ADC 1062 - Certification, Rating and Test Manual.

B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.

C. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 15010.

1.6 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.

B. Test and rate louver performance in accordance with AMCA 500.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 GRILLES AND REGISTERS

A. Panel ceiling diffusers shall meet the following requirements. Factory-furnished diffusers, constructed of aluminum. Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded. Color shall be white. Manufacturer certified sound pressure level rating of outlets shall be less than 25 dB room sound pressure level. The distance from the diffuser, to the point which the air velocity falls below 150 feet per minute shall not exceed 1.5 times the outlet mounting height. Maximum drop of air stream shall not be within 6 feet of the floor at the end of the throw. Equip with baffles or other devices required to provide proper air distribution pattern. Provide factory-fabricated, single key, opposed blade volume dampers. Internal parts shall be removable through the diffuser neck for access to the duct and without the use of special tools. Construct each ceiling diffuser of four or more concentric elements designed to deliver air in a generally horizontal direction without excess smudging of the ceiling. Interior elements of square and rectangular ceiling diffusers may be square or rectangular as manufacturer's standard. Provide with panel for installation in 24" x 24" lay-in type ceiling and square to round duct connection.

B. Ceiling diffusers for other than lay-in ceilings shall be equal to panel diffusers without the panel.

C. Exhaust registers shall be steel grilles with 1/2" spacing at 0 degree fixed deflection with damper. The finish shall be white.

D. Ceiling return air registers shall be aluminum with 3/4" spacing at 0 degree fixed deflection with damper. The registers shall fit in 2' X 2' ceiling grid and the register shall have a minimum of 6" deep full face transition from the register to duct. Finish to be white.

E. Transfers grilles the grilles shall be the same as ceiling return air registers without dampers.

F. Ceiling return air grilles same as registers without dampers.

2.2 WALL LOUVERS

A. Furnish and install louvers as hereinafter specified where shown on plans or as described in schedules and approved by architect. Louvers shall be stationary type with downspouts in jambs and mullions. Blades shall be entirely contained within a 4" frame. Louver components (heads, jambs, sills, blades & mullions) shall be factory assembled by the louver manufacturer. Louver sizes too large for shipping shall be built up by the contractor from factory assembled louver sections to provide overall sizes required. Louver design shall incorporate structural supports required to withstand a wind load of 20 lbs. per sq. ft.

B. Louvers shall be construction as follows:

1. Frame: 4" deep, 6063T5 extruded aluminum with .080" nominal wall thickness.

Downspouts and caulking slots provided.

2. Blades: 6063T5 extruded aluminum .080" nominal wall thickness. Blades are positioned at 45 degree angle and spaced approximately 5 3/32"" center to center.

3. Screen: 3/4" X .051" expended, flattened aluminum bird screen in removable frame.

4. Finish: Baked enamel, color to be selected by Owner from standard color chart.

C. Published louver performance data bearing the AMCA Certified Ratings Seal for Air Performance must be submitted for approval prior to fabrication and must demonstrate pressure drop. The static pressure drop shall be less than .1 inch of water at a air velocity of 600 feet per minute. The louvers shall have a minimum of 50% free area.

PART 3 EXECUTION

3.1INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black.

F. The backside of the inlets and outlets shall be insulated and have a vapor barrier.

END OF SECTION

SECTION 159720 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 GENERAL

1.0 SECTION INCLUDES

A. Building Automation System - General Description

B. Approved Control System Manufactures

C. Quality Assurance

D. Codes And Standards

E. System Performance

F. Submittal Requirements

G. Warranty Requirements

H. System Maintenance And Remote Analysis

I. Ownership Of Proprietary Material

J. Definitions

1.1 BUILDING AUTOMATION SYSTEM - GENERAL DESCRIPTION

A. Provide a new Building Automation System (BAS) to integrate and control all mechanical equipment associated with this project.

1. The Building Automation System shall be as indicated on the drawings and described in these specifications. System must be fully integrated and coordinated with mechanical equipment DDC controllers furnished and installed in the equipment manufacturer’s factory as specified in those sections. The intent of the BAS is to integrate all mechanical equipment into one system for global monitoring, control, and alarming associated with the building. It is the BAS manufacturer’s responsibility to provide all the design, engineering, and field coordination required to ensure all equipment sequence of operations are met as specified and the designated BAS operators have the capability of managing the building mechanical system to ensure occupant comfort while maintaining energy efficiency.
2. The BAS shall meet open standard protocol communication standards (As defined in System Communications Section) to ensure the system maintains “interoperability” to avoid proprietary arrangements that will make it difficult for the Owner to consider other BAS manufacturers in future projects.
3. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems and terminal devices on this project.
4. Approved vendors, products and web services shall comply with SOC2 Type I as defined by the AICPA. SOC2 Type 1 compliance is a certification that confirms that a service provider has established and implemented effective controls to secure their clients' data in accordance with the Trust Services Criteria (TSC).

a. SOC2 Type 1 compliance provides assurance to customers that the service provider has established and implemented effective security controls and is committed to protecting their data.
b. To achieve SOC2 Type 1 compliance, the manufacturer shall have completed an independent audit to assess design and implementation of their controls, policies, and procedures.

5. The BAS shall accommodate simultaneous multiple user operation. Access to the control system data should be limited only by the security permissions of the operator role. Multiple users shall have access to all valid system data. An operator shall be able to log onto any workstation on the control system and have access to all appropriate data.

1.2 APPROVED CONTROL SYSTEM MANUFACTURES

A. Approved BAS Manufacturers

1. Trane Tracer®

1.3 QUALITY ASSURANCE

A. BAS Manufacturer Qualifications

1. The BAS manufacturer shall have an established business office within 50.00 miles of the project site and must provide 24 hours/day, 7 days/week response in the event of a customer warranty or service call.
2. The BAS Manufacturer shall have factory trained and certified personnel providing all engineering, service, startup, and commissioning field labor for the project from their local office location. BAS manufacturer shall be able to provide training certifications for all local office personnel upon request.
3. The BAS shall be provided by a single manufacturer and this manufacturer's equipment must consist of operator workstation software, Web-based hardware/software, Open Standard Protocol hardware/software, Custom application Programming Language, Graphical Programming Language, Building Controllers, Custom Application Controllers, and Application Specific Controllers. All other products specified herein (i.e., sensors, valves, dampers, actuators, etc.) need not be manufactured by the BAS manufacturer listed in this specification.
4. Independent representatives of BAS manufacturers are not acceptable. BAS vendor must be corporate owned entity of BAS manufacturer.

1.4 CODES AND STANDARDS

A. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.

1. Underwriters Laboratories: Products shall be UL-916-PAZX listed.
2. National Electrical Code -- NFPA 70.
3. Federal Communications Commission -- Part J.
4. ASHRAE/ANSI 135-2012 (BACnet) - (System Level Devices) - Building Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.

5. ASHRAE/ANSI 135-2012 (BACnet) - (Unit Level Devices) - Unit Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.

1.5 SYSTEM PERFORMANCE

A. Performance Standards. The BAS system shall conform to the following:

1. Graphic Display. The system shall display a graphic with a minimum of 20 dynamic points. All current data shall be displayed within 10 seconds of the operator's request.
2. Graphic Refresh. The system shall update all dynamic points with current data within 10 seconds.
3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be 5 seconds. Analog objects shall start to adjust within 5 seconds.
4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current within the prior 10 seconds.
5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 10 seconds.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.
7. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
8. Multiple Alarm Annunciations. All workstations on the network shall receive alarms within 5 seconds of each other.

1.6 SUBMITTAL REQUIREMENTS

A. BAS manufacturer shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software being provided for this project. No work may begin on any segment of this project until the Engineer and Owner have reviewed submittals for conformity with the plan and specifications.

1. Provide three (3) printed copies of submittal package for review and approval.

B. Quantities of items submitted shall be reviewed by the Engineer and Owner. Such review shall not relieve the BAS manufacturer of furnishing quantities required based upon contract documents.

C. Provide the Engineer and Owner, any additional information or data which is deemed necessary to determine compliance with the specifications or which is deemed valuable in documenting and understanding the system to be installed.

D. All shop drawings shall be provided to the Owner electronically as .dwg or .dxf file formats once they have been approved and as-built drawings have been completed.

E. Submit the following within 90 days of contract award:

1. A complete bill of materials of equipment to be used indicating quantities, manufacturers and model numbers.
2. A schedule of all control valves including the valve size, pressure drop, model number (including pattern and connections), flow, CV, body pressure rating, and location.
3. A schedule of all control dampers including damper size, pressure drop, manufacturer, and model number.
4. Provide all manufacturers' technical cut sheets for major system components. When technical cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Include:

    a. Building Controllers
    b. Custom Application Controllers
    c. Application Specific Controllers
    d. Operator Workstations
    e. Portable Operator Terminals
    f. Auxiliary Control Devices

5. Provide proposed Building Automation System architectural diagram depicting various controller types, workstations, device locations, addresses, and communication cable requirements
6. Provide detailed termination drawings showing all required field and factory terminations, as well as terminal tie-ins to DDC controls provided by mechanical equipment manufacturers. Terminal numbers shall be clearly labeled.
7. Provide a sequence of operation for each controlled mechanical system and terminal end devices.
8. Provide a BACnet Protocol Implementation Conformance Statement (PICS) for each BACnet system level device (i.e. Building Controller & Operator Workstations) type. This defines the points list for proper coordination of interoperability with other building systems if applicable for this project.

F. Project Record Documents: Upon completion of installation, submit three (3) copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and include:

1. Project Record Drawings - These shall be as-built versions of the submittal shop drawings. One set of electronic media including CAD .dwg and .pdf drawing files shall be provided.
2. Testing and Commissioning Reports and Checklists signed off by trained factory (equipment manufacturers) and field (BAS) commissioning personnel.
3. Operating and Maintenance (O & M) Manuals - These shall be as-built versions of the submittal product data. In addition to the information required for the submittals, Operating & Maintenance manual shall include:

    a. Procedures for operating the BAS including logging on/off, alarm management, generation of reports, trends, overrides of computer control, modification of setpoints, and other interactive system requirements.
    b. Explanation of how to design and install new points, new DDC controllers, and other BAS hardware.

c. Documentation, installation, and maintenance information for all third party hardware/software products provided including personal computers, printers, hubs, sensors, valves, etc.
d. Original issue media for all software provided, including operating systems, programming language, operator workstation software, and graphics software.
e. Licenses, Guarantee, and Warranty documents for all equipment and systems.

G. Training Manuals: The BAS manufacturer shall provide a course outline and copies of training manuals at least two weeks prior to the start of any corporate training class to be attended by the Owner.

1.7 WARRANTY REQUIREMENTS

A. Warrant all work as follows:

1. BAS system labor and materials shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. BAS failures during the warranty period shall be adjusted, repaired, or replaced at no charge to the Owner. The BAS manufacturer shall respond to the Owner's request for warranty service within 24 hours of the initiated call and will occur during normal business hours (8AM-5PM).
2. At the end of the final start-up/testing, if equipment and systems are operating satisfactorily to the Owner and Engineer, the Owner shall sign certificates certifying that the BAS is operational, and has been tested and accepted in accordance with the terms of this specification. The date of Owner's acceptance shall be the start of the warranty period.
3. To ensure that the owner will have the most current operating system provided by the manufacturer, the BAS manufacturer shall include licensing and labor costs to facilitate software/firmware updates throughout the warranty period at no charge to the owner. These updates shall include upgrades for functional enhancements associated with the following: operator workstation software, project specific software, graphics, database, firmware updates, and all security related service packs. Written authorization by the Owner must be granted prior to the installation of these updates.
4. The BAS manufacturer shall provide a web-accessible Users Network for the proposed System and give the Owner free access to question/answer forum, user tips, upgrades, and training schedules for a one year period of time correlating with the warranty period.

1.8 SYSTEM MAINTENANCE AND REMOTE ANALYSIS

A. The BAS Manufacture shall provide Building Automation System remote support and system analysis for a period of 1 year (beginning the date of substantial completion).

B. The BAS manufacturer shall setup a secure remote connection for data collection, analytics and remote technical support for the HVAC systems included in this contract.

1. Provide technician support during the warranty period to diagnose issues remotely through the secure remote connection.
2. The building owner is responsible for providing adequate internet access.

C. Connectivity / Remote Access / Network Security

1. Provide and maintain secure remote access to the facilities Building Automation System (BAS) or other building systems. Users accessing service through this connection shall not have access to the building owners network. Secure remote access to the BAS shall not require ANY inbound ports on a firewall to be “exposed” or “forwarded”.
2. Secure remote access to the BAS shall be available anywhere, anytime, using a compatible client device (PC/tablet/phone)
3. The Owner will provide up to Three (3) IP drops and IP addresses on the owners network to gain access to the internet. The BAS manufacture shall coordinate with the Owners IT team, verify the proposed system shall meet all network security requirements and any other network configuration information necessary to each control contractor for the purpose of configuring each Area Controller on the network. It shall be the responsibility of the BAS manufacture to coordinate with the owner for network connectivity.

D. The BAS Manufacture shall provide a professional analysis for the facility HVAC systems.

1. The analysis shall consist of an evaluation of HVAC systems including charts and graphs which indicate both current building performance and opportunities for building and HVAC system performance improvement.

E. The following shall be provided after substantial completion of the project:

1. Orientation meeting with the building owner’s representative to identify the HVAC systems that will be evaluated.
2. System setup for data collection and analytics. BAS Manufacture to setup a secure remote data collection and analytics for identified systems.
3. Assessment analysis shall be performed by trained personnel with relevant professional credentials in HVAC systems, energy management and building optimization methodologies.
4. Consultation meeting with owner to review performance reports and improvement opportunities.

F. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of owner.

1.9 OWNERSHIP OF PROPRIETARY MATERIAL

A. Project specific software and documentation shall become the owner’s property upon project completion. This includes the following:

1. Operator Graphic files
2. As-built hardware design drawings
3. Operating & Maintenance Manuals
4. BAS System software database

1.10 DEFINITIONS

A. DDC: Direct digital control

B. I/O: Input/output.

C. MS/TP: Manager Subordinate / Token Passing.

D. POT: Portable Operator's Terminal.

E. PID: Proportional plus integral plus derivative.

F. RTD: Resistance temperature detector.

G. BAS/ATC: Building Automation System/Automatic Temperature Controls.

PART 2 PRODUCTS

2.0 SECTION INCLUDES

A. Materials:

B. Dedicated Outdoor Air System - Communications

C. Dedicated Outdoor Air System - Operator Interface

D. Dedicated Outdoor Air System - Controller Software

E. Dedicated Outdoor Air System - Building / System Controllers

F. Advanced Application Controllers

G. Application Specific Controllers:

H. Input/Output Interface:

I. Power Supplies:

J. Axillary Control Devices:

K. Wiring And Raceways:

2.1 MATERIALS:

A. Use new products that the manufacturer is currently manufacturing and that have been installed in a minimum of 25 installations. Do not use this installation as a product test site unless explicitly approved in writing by the owner or the owner's representative. Spare parts shall be available for at least five years after completion of this contract.

2.2 DEDICATED OUTDOOR AIR SYSTEM - COMMUNICATIONS

A. System Communications

1. Each workstation, building controller, and equipment controller communication interface shall utilize the BACnet protocol with an Ethernet (IEEE 802.3, 802.11), RS485 (EIA-485), or Zigbee (802.15.4) physical interface and an appropriate data link technology as defined in ANSI®/ASHRAE® Standard 135-2012. (e.g. BACnet IP, BACnet IPv6, BACnet MS/TP, BACnet Zigbee).

2. All system controllers shall be BTL listed as a BACnet Building Controller (B-BC) as defined in ANSI®/ASHRAE® Standard 135-2012.
3. All documented status and control points, schedule, alarm, and data-log services or objects shall be available as standard object types as defined in ANSI®/ASHRAE® Standard 135-2012.
4. Each System Controller shall communicate with a network of Custom Application and Application Specific Controllers utilizing one or more of the interfaces documented within Field Bus Communications below.
5. For minimally managed IP networks, BACnet communication shall support BACnet Secure Connect (BACnet/SC), a secure and encrypted datalink layer specifically design for those networks.

B. Field Bus Communications

1. BACnet

a. All equipment and plant controllers shall be BTL listed as a BACnet Application Specific Controller (B-ASC) or a BACnet Advanced Application Controller (B-AAC) as defined in ANSI®/ASHRAE® Standard 135-2012.
b. All communication shall conform to ANSI®/ASHRAE® Standard 135-2012.
c. System Controller shall function as a BACnet router to each unit controller providing a globally unique BACnet Device ID for all BACnet controllers within the system.
d. BACnet Zigbee

1) Communication between System Controller and equipment/plant controllers shall utilize BACnet Zigbee as defined in ANSI®/ASHRAE® Standard 135-2012.
2) Each equipment controller wireless communication interface shall self-heal to maintain operation in the event of network communication failure.
3) Each zone sensor wireless communication interface shall be capable of many-to-one sensors per controller to support averaging, monitoring, and multiple zone applications. Sensing options shall include temperature, relative humidity, CO2, and occupancy.

e. BACnet MS/TP

1) Communication between System Controller and equipment/plant controllers shall utilize BACnet MS/TP as defined in ANSI®/ASHRAE® Standard 135-2012.

2.3 DEDICATED OUTDOOR AIR SYSTEM - OPERATOR INTERFACE

A. Provide Operator Web Interface to allow system operators to view and adjust Dedicated Outdoor Air System status, set-points and alarms.

1. Manufacturer shall provide a user interface with time-of-day schedules, data collection, dashboards, reports and building summary, system applications, and self-expiring timed overrides. Manufacturer shall provide a published user and applications guide(s) that detail the system application operation, configuration, setup and troubleshooting.
2. The building operator web interface shall be accessible via a web browser without requiring any “plug-ins” (i.e. JAVA Runtime Environment (JRE), Adobe Flash).
3. User Roles

a. The system shall include pre-defined “roles” that allow a system administrator to quickly assign permissions to a user.
b. User logon/logoff attempts shall be recorded.
c. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable.

4. On-Line Help and Training

a. Provide a context sensitive, on line help system to assist the operator in operation and configuration of the system.
b. On-line help shall be available for all system functions and shall provide the relevant data for each particular screen.

5. Equipment and Application Pages

a. The operator web interface shall include standard pages for all equipment and applications. These pages shall allow an operator to obtain information relevant to the operation of the equipment and/or application, including:

1) Animated Equipment Graphics for each major piece of equipment and floor plan in the System. This includes:

a) Each Chiller, Air Handler, VAV Terminal, Fan Coil, Boiler, and Cooling Tower. These graphics shall show all points dynamically as specified in the points list.
b) Animation capabilities shall include the ability to show a sequence of images reflecting the position of analog outputs, such as valve or damper positions. Graphics shall be capable of launching other web pages.

2) Alarms relevant to the equipment or application without requiring a user to navigate to an alarm page and perform a filter.
3) Historical Data (As defined in Data Log section below) for the equipment or application without requiring a user to navigate to a Data Log page and perform a filter.

B. Provide Dedicated Outdoor Air System graphics: An operator shall be able to view and control (where applicable) the following parameters via the operator web interface:

1. System Mode
2. System Occupancy
3. Ventilation (Outdoor air flow) setpoint
4. Ventilation (Outdoor air flow) status
5. Air Handler Static pressure setpoint
6. Air Handler Static pressure status
7. Air Handler Occupancy status
8. Air Handler Supply air cooling and heating set points
9. Air Handler minimum, maximum and nominal static pressure setpoints
10. VAV box minimum and maximum flow
11. VAV box drive open and close overrides
12. VAV box Airflow to space

13. Average space temperature
14. Minimum space temperature
15. Maximum space temperature

C. System Graphics. Building operator web interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using colors to represent zone temperature relative to zone set point.

1. Graphic imagery – graphics shall use 3D images for all standard and custom graphics. The only allowable exceptions will be photo images, maps, schematic drawings, and selected floor plans.
2. Animation. Graphics shall be able to animate by displaying different Image lies for changed object status.
3. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator

D. Graphics Library. Furnish a library of standard HVAC equipment such as chillers, air handlers, terminals, fan coils, unit ventilators, rooftop units, and VAV boxes, in 3-dimensional graphic depictions. The library shall be furnished in a file format compatible with the graphics generation package program

E. Manual Control and Override.

1. Point Control. Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.
2. Temporary Overrides. The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.
3. Override Owners. The system shall convey to the user the owner of each override for all priorities that an override exists.
4. Provide a specific icon to show timed override or operator override, when a point, unit controller or application has been overridden manually.

F. Scheduling. - The scheduling application shall provide graphical representation of the day, week, month and exception events.

G. Alarm/Event Notification

1. Alarm/Event Log. The operator shall be able to view all logged system alarms/events from any building operator web interface.

    a. The operator shall be able to sort and filter alarms from events. Alarms shall be sorted in a minimum of 4 categories based on severity.
    b. The operator shall be able to acknowledge and add comments to alarms
    c. Alarm/event messages shall use full language, easily recognized descriptors.

2. Alarm Suppression. Alarms shall be able to be suppressed based on load/source relationships to present the likely root cause to the building operator as described in ASHRAE Guideline 36. Load/Source relationships shall be configurable by the user through a web interface.

H. Reports and Logs.

1. The building operator web interface shall provide a reporting package that allows the operator to select reports.
2. The building operator web interface shall provide the ability to schedule reports to run at specified intervals of time.
3. The following standard reports shall be available without requiring a user to manually configure the report:

    a. All Points in Override Report: Provide an on demand report showing all overrides in effect.
    b. Commissioning Report: Provide a one-time report that lists all equipment with the unit configuration and present operation.
    c. All Points in Alarm Report: Provide an on demand report showing all current alarms.
    d. Points report: Provide a report that lists the current value of all points

4. The controls vendor shall provide a hardening report that summarizes the port configuration details to ensure sites have not been exposed to the Internet in alignment with Cyber Security best practices.

I. Provide Local Occupant Interface – Touch sensitive display

1. Provide a color touch sensitive display that allows the building occupants to accomplish the following tasks:

    a. Occupant override of the system/equipment operating mode shall be possible with a single touch on the local operator display. With the ability to set up point overrides to expire at designated times
    b. The local operator display shall provide occupant access to system time of day scheduling. Occupants shall have the ability to schedule events more than one year in advance. Exception schedules and holidays shall be shown clearly on the calendar, visible to the occupant on the touchscreen display.
    c. The local operator display shall offer PIN control, which shall limit system control access to only those with proper login credentials.
    d. The local operator display shall display the alerts that require service of the connected equipment.

2. To ensure interoperability with the Building Automation System (BAS), the local operator display shall be provided by the BAS solution provider associated with this project.
3. Local operator display shall be a minimum of 10 inches in size and be provided with mounting hardware to allow it to be installed on an office wall or control panel door.

2.4 DEDICATED OUTDOOR AIR SYSTEM - CONTROLLER SOFTWARE

A. Dedicated Outdoor Air System Controls Manufacturer shall provide standard applications to deliver HVAC system control. Standard applications include Time of Day Scheduling with Optimal Start/Stop, Dedicated Outdoor Air Systems Control, Chiller Plant Control, Historical

Trend Logs and Trim and Respond. Manufacturer shall provide system optimization strategies for functions such as fan pressure optimization and ventilation optimization.

B. Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the building operator interface.

1. Dedicated Outdoor Air Systems Applications

a. The BAS shall provide air system applications that coordinate air handlers (AHU)/rooftop units (RTU) and terminal equipment.
b. The air system applications shall perform the following functions:

1) Startup and shutdown the air handler safely. Ensure the VAV boxes are open sufficiently when the air handler is running, to prevent damage to the ductwork and VAV boxes due to high air pressure.
2) Optimized Control of Supply Duct Static Pressure (ASHRAE 90.1) - Minimize energy usage by controlling system static pressure to the lowest level while maintaining zone airflow requirements. System static pressure controlled to keep the “most open” zone damper between 65% and 75% open.
3) During commissioning, and with the engineer/owner, the controls contractor shall confirm the performance of Optimized Control of Supply Duct Static Pressure by conducting a field functional test that demonstrates critical zone reset.
4) Optimized Control of Ventilation (Ventilation Optimization) with OA Flow Measurement (ASHRAE 62) – properly ventilate all spaces while minimizing operating energy costs.

c. The Air Systems application shall provide a user interface that includes status of current system operation with real time data of key operating parameters. Key operating parameters include:

1) Duct Static Pressure
2) Duct Static Optimization Setpoint
3) Outdoor Airflow
4) Ventilation Optimization Setpoint
5) Duct Static Optimization Maximum VAV Damper/Source VAV Box
6) Ventilation Optimization Maximum VAV Vent Ratio/Source VAV box
7) Discharge Air Temperature
8) Discharge Air Temperature Optimization Setpoint
9) Duct Static Optimization System Requests
10) Discharge Air Temperature Optimization System Requests

d. The air system application status screens shall explain what optimization calculations are occurring, critical parameters, and source equipment members.
e. The air systems applications shall provide a user interface that enables configuration changes made by swipe and type fields, selection list, and check box entry for feature definition:

1) VAV Auxiliary Night Heat

2) VAV Source Temperature Distribution
3) Start/Stop Delay operation
4) Enable/Disable Optimization Strategies

f. The operation of Terminal equipment members of the Air System shall be selected by check box to optionally participate in the following functions:

1) System calculations (min, max, average)
2) Duct Pressure Optimization
3) Ventilation Optimization
4) Drive to Maximum Override
5) Common Source Temperature
6) Common Space
7) Discharge Air Temperature Optimization

2. The air system application vendor shall provide a published applications guide that details the air system application operation, configuration, setup, and troubleshooting. The applications guide documentation shall be maintained under version control, and updated by the manufacture to reflect most recent feature updates as made available. Contents of the guide shall include:

a. Description of System Operation
b. Required Components
c. Sequences of Operation
d. Installation
e. Controller Setup
f. Required Programming
g. Commissioning
h. Optimization Strategies
i. Special Applications
j. Troubleshooting

3. The air system application shall present in plain user language the current operation with source zone information and reset events.

C. Trend Logs

1. The system shall harvest trend logs for defined key measurements for each controlled HVAC device and HVAC application. Trend logs shall be captured for a minimum of 5 key operating points for each piece of HVAC equipment and HVAC application and stored for no less than 1 year at 15-minute intervals. Data Logs shall be capable of being configured on an interval or change of value basis.

a. Variable Air System (VAS)

1) Duct Static Optimization Duct Static Setpoint
2) Space Temperature Average
3) Ventilation Optimization Air Setpoint
4) Operating Mode

5) Duct Pressure Optimization Maximum

b. Air Handling Unit/Rooftop (VAV)

1) Discharge Air Temperature
2) Discharge Air Temperature Setpoint Active
3) Space Temperature Active
4) Cooling Capacity Status
5) Discharge Air Flow

c. Air Handling Unit/Rooftop (CV)

1) Discharge Air Temperature
2) Space Temperature Active
3) Space Temperature Setpoint Active
4) Cooling Capacity Status
5) Heating Capacity Primary Status
6) Outdoor Air Damper Position

d. VAV box

1) Discharge Air Temperature
2) Space Temperature Active
3) Space Temperature Setpoint Active
4) Air Flow Setpoint Active
5) Discharge Air Flow

2.5 DEDICATED OUTDOOR AIR SYSTEM - BUILDING / SYSTEM CONTROLLERS

A. There shall be one or more independent, standalone microprocessor based System Controllers to manage the global strategies described in CONTROLLER SOFTWARE section.

1. The controller shall provide a USB communications port for connection to a PC.
2. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
3. All System Controllers shall have a real time clock and shall be able to accept a BACnet time synchronization command for automatic time synchronization.
4. Data shall be shared between networked System Controllers.
5. Serviceability – The System Controller shall have a display on the main board that indicates the current operating mode of the controller.

B. Controls manufacturer shall provide secure remote access to the Building Automation System (BAS). Secure remote access shall not require IP ports to be "exposed" (i.e. port-forwarded or external public IP addresses) to the Internet. Controls manufacturer shall update secure remote access software as necessary to follow cyber security best practices and respond to cyber security events.

2.6 ADVANCED APPLICATION CONTROLLERS

A. Advance Application Controllers shall be used to control all equipment or applications of medium and high complexity, including but not limited to Air Handlers, Boiler Plants and Chiller Plants.

B. The Advanced Application Controller shall be capable of operating as a stand-alone controller or as a member of a Building Automation System (BAS).

C. When the Advanced Application Controller is operating as a member of a Building Automation System (BAS), the application controller shall operate as follows:

1. Application Controller will receive operation mode commands from the BAS network controller. The BAS commands shall include but not be limited to the follow: Occupied Heat/Cool, Unoccupied Heat/Cool, Morning Warm-up, / Pre-cool, Occupied Bypass).
2. Application Controller will provide equipment status parameters to the BAS through BACnet communication.
3. Application Controller will operate as a stand-alone controller in the event of communication failure with the BAS.
4. In case of communications failure, stand-alone operation shall use default values or last known values for remote sensors read over the network such as outdoor air temperature.

D. For Stand-Alone Operation of Advanced Application Controllers:

1. Shall operate a schedule in a standalone application using a Real Time Clock with a 7 day power backup.

    a. The Controller shall have a built in schedule (assessable with or without a display)
    b. Support will be for at least 3 schedules with up to 10 events for each day of the week.
    c. Each of the 3 schedules can be Analog, Binary or Multi-State
    d. The controller shall support a minimum of 25 exceptions each with up to 10 events.

E. For ease of troubleshooting, the Controller shall support data trend logging.

1. Trends shall be capable of being collected at a minimum sample rate of once every second
2. Shall be capable of trending all BACnet points used by controller
3. Trends shall be capable of being scheduled or triggered.
4. With a minimum of 20,000 trending points total on a controller

F. To meet the sequence of operation for each application, the Controller shall use library programs provided by the controller manufacturer that are either factory loaded or downloaded with service tool to the controller.

G. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.

1. Operating conditions:
    a. Temperature: -40°F to 158°F (-40°C to 70°C)
    b. Relative Humidity: Between 5% to 100% RH (non-condensing)

2. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum.
3. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40° F to 158° F [-40° C to 70° C].

H. Input/Output: The Controller shall have on board or through expansion module all I/O capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment. In addition other controls must meet the following requirements:

1. Shall support flexibility in valve type, the controllers shall be capable of supporting the following valve control types: 0-10VDC, 0-5VDC, 4-20mA, 24VAC - 2 position.
2. Shall support flexibility in sensor type, the Controller shall be capable of reading sensor input ranges of 0 to10V, 0 to 20mA, 50ms or longer pulses, 200 to 20Kohm and RTD input.
3. Shall support flexibility in sensor type, all Analog Outputs shall have the additional capability of being programmed to operate as Universal Inputs or Pulse Width Modulation Outputs.
4. Shall support flexibility in sensor type, the Controller and/or expansion modules shall support dry and wetted (24VAC) binary inputs.
5. The controller shall support pulse accumulator for connecting devices like energy meters.
6. In order to support a wide range of devices, the Controller's binary output shall be able to drive at least 10VA each.
7. Any unused I/O that is not needed for the functionality of the equipment shall be available to be used by custom programs on the Controller and by any other controller on the network.
8. The Controller shall provide 24VAC and 24VDC power terminals sensors and other devices required.
9. The Controller shall provide a dedicated static pressure input.

I. Input/Output Expandability – The Controller shall provide the following functionality in order to meet current and future application needs:

1. For the application flexibility, the Controller shall be capable of expanding to a total of at least 100 hardware I/O terminations.
2. Expansion I/O can be mounted up to 650 ft. (200m) from control.
3. To keep BACnet MS/TP network traffic to a minimum, expansion I/O must communicate via an internal controller communication bus (point expansion via the BACnet MS/TP network is not allowed).

J. Serviceability – The Controller shall provide the following in order to improve serviceability of the Controller.

1. Diagnostic LEDs for power/normal operation/status, BACnet communications, sensor bus communications, and binary outputs. All wiring connections shall be clearly labeled and made to be field removable.
2. Binary and analog inputs and outputs shall use removable connectors or be connected to terminal strip external to the control box.
3. Software service tool connection through the following methods: direct cable connection to the Controller, connection through another controller on BACnet link.
4. For safety purposes, the controller shall be capable of being powered by a portable computer's USB port for the purposes of configuration, programming and testing programs so that this work can be accomplished with the power off to the associated equipment.
5. The Controller software tool service port shall utilize standard off-the-shelf USB printer cable.
6. Capabilities to temporarily override the BACnet point values with built-in time expiration in the Controller.

7. To aid in service replacement, the Controller shall easily attached to standard DIN rail mounting.
8. For future expansion, the Controller shall be capable of adding sequence of operation programming utilizing service tools software with a graphical programming interface (editing or programming in line code is not permissible).
9. To aid in service replacement, the Controller shall allow for setting its BACnet address via controller mounted rotary switches that correspond to the numerical value of the address. (DIP switch methodologies are not allowed). Setting of the address shall be accomplished without the need of a service tool or power applied to the controller.
10. Controller data shall be maintained through a power failure.

K. Software Retention: All Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.

L. Controller must meet the following Agency Compliance:

1. UL916 PAZX, Open Energy Management Equipment
2. UL94-5V, Flammability
3. FCC Part 15, Subpart B, Class B Limit
4. BACnet Testing Laboratory (BTL) listed as BACnet Advanced Application Controller (B-AAC)

2.7 APPLICATION SPECIFIC CONTROLLERS:

A. General Description

1. Application Specific Controllers (ASC) shall be microprocessor-based DDC controllers which, through hardware or firmware design, control specified equipment. They are not user programmable, but are customized for operation within the confines of the equipment they are designed to serve.
2. Zone Controllers are controllers that operate equipment that control the space temperature of single zone. Examples are controllers for VAV, Fan coil, Blower Coils, Unit Ventilators, Heat Pumps, and Water Source Heat Pumps.

B. The Application Specific Controller shall be capable of operating as a stand-alone controller or as a member of a Building Automation System (BAS).

C. When the Application Specific Controller is operating as a member of a Building Automation System (BAS), the application controller shall operate as follows:

1. Application Controller will receive operation mode commands from the BAS network controller. The BAS commands shall include but not be limited to the follow: Occupied Heat/Cool, Unoccupied Heat/Cool, Morning Warm-up, / Pre-cool, Occupied Bypass).
2. Application Controller will provide equipment status parameters to the BAS through BACnet communication.
3. Application Controller will operate as a stand-alone controller in the event of communication failure with the BAS.

4. In case of communications failure stand-alone operation shall use default values or last known values for remote sensors read over the network such as outdoor air temperature.

D. Stand-Alone Operation: Each piece of equipment specified in section “A” shall be controlled by a single controller and provide stand-alone control in the event that a BAS is not present.

E. Software

1. To meet the sequence of operation for each zone control, the controller shall use programs developed and tested by the controller manufacturer that are either factory loaded or downloaded with service tool to the controller.
2. For controlling ancillary devices and for flexibility to change the sequence of operation in the future, the controller shall be capable running custom programs written in a graphical programming language.

F. Environment: Controller hardware shall be suitable for the anticipated ambient conditions.

1. Storage: -55° to 203° F (-48° to 95° C) and 5 to 95% Rh, non-condensing.
2. Operating: -40° to 158° F (-40 to 70° C) and 5 to 95% Rh, non-condensing.
3. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum.
4. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40° to 158° F [-40° to 70° C].

G. Input/Output:

1. For flexibility in selection and replacement of valves, the controllers shall be capable of supporting all of the following valve control types 0-10VDC, 0-5VDC, 4-20mA, 24VAC floating point, 24VAC - 2 position (Normally Open or Normally Closed).
2. For flexibility in selection and replacement of sensors, the controllers shall be capable of reading sensor input ranges of 0 to10V, 0 to 20mA, pulse counts, and 200 to 20Kohm.
3. For flexibility in selection and replacement of binary devices, the controller shall support dry and wetted (24VAC) binary inputs.
4. For flexibility in selection and replacement devices, the controller’s shall have binary output which are able to drive at least 12VA each.
5. For flexibility in selection and replacement of motors, the controller shall be capable of outputting 24VAC (binary output), DC voltage (0 to 10VDC minimum range) and PWM (in the 80 to 100 Hz range).
6. For future needs, any I/O that is unused by functionality of equipment control shall be available to be used by custom program on the controller and by another controller on the network.
7. For future expansion and flexibility, the controller shall have either on board or through expansion, 20 hardware input/output points. Expansion points must communicate with the controller via an internal communications bus. Expansion points must be capable of being mounted up to 650ft. (200 m) from the controller. Expansion points that require the BACnet network for communication with the controller are not allowed.

H. Serviceability – The controller shall provide the following in order to improve serviceability of the controller.

1. Diagnostic LEDs shall indicate correct operation or failures/faults for all of the following: power, sensors, BACnet communications, and I/O communications bus.
2. All binary output shall have LED's indicating the output state.
3. All wiring connectors shall removable without the use of a tool.
4. Software service tool connection through all of the following methods: direct cable connection to the controller, connection through another controller on BACnet link
5. For safety purposes, the controller shall be capable of being powered by a portable computer for the purposes of configuration, programming, and testing programs so that this work can be accomplished with the power off to the equipment.
6. Capabilities to temporarily override of BACnet point values with built-in time expiration in the controller.
7. BACnet MAC Address shall be set using decimal (0-9) based rotary switches.

    a. Configuration change shall not be made in a programming environment, but rather by a configuration page utilizing dropdown list, check boxes, and numeric boxes.

8. For ease of troubleshooting, the Controller shall support BACnet data trend logging.

    a. With a minimum of 20,000 trending points total on controller
    b. Trends shall be capable of being collected at a minimum sample rate of once every second.
    c. Shall be capable of trending all BACnet points used by controller

I. Trends shall be capable of being scheduled or triggered

J. Software Retention: All Zone Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.

K. Application controller shall meet the following Agency Compliance:

1. UL916 PAZX, Open Energy Management Equipment
2. UL94-5V, Flammability
3. FCC Part 15, Subpart B, Class B Limit
4. BACnet Testing Laboratory (BTL) listed as BACnet Application Specific Controller (B-ASC)

2.8 INPUT/OUTPUT INTERFACE:

A. Hardwired inputs and outputs may tie into the system through building, custom application, or ASCs.

B. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground will cause no damage to the controller. All input and output points shall be protected from voltage up to 24V of any duration, such that contact with this voltage will cause no damage to the controller.

C. Binary inputs shall allow the monitoring of on/off signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against the effects of contact bounce and noise. Binary

inputs shall sense “dry contact” closure without external power (other than that provided by the controller) being applied.

D. Pulse accumulation input objects. This type of object shall conform to all the requirements of binary input objects and also accept up to 10 pulses per second for pulse accumulation.

E. Analog inputs shall allow the monitoring of low voltage (0 to 10 VDC), current (4 to 20 mA), or resistance signals (thermistor, RTD). Analog inputs shall be compatible with and field configurable to commonly available sensing devices.

F. Binary outputs shall provide for on/off operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on building and custom application controllers shall have status lights. Outputs shall be selectable for either normally open or normally closed operation.

G. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0 to 10VDC or a 4 to 20 mA signal as required to provide proper control of the output device. Analog outputs shall not exhibit a drift of greater than 0.4% of range per year.

H. Tri-State Outputs. Provide tri-state outputs (two coordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three-point floating devices shall be limited to zone control and terminal unit control applications (VAV terminal units, duct-mounted heating coils, zone dampers, radiation, etc.). Control algorithms shall run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

I. System Object Capacity. The system size shall be expandable to at least twice the number of input/ output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system.

2.9 POWER SUPPLIES:

A. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish overcurrent protection in both primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.

1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in overvoltage and overcurrent protection and shall be able to withstand a 150% current overload for at least three seconds without trip-out or failure.

    a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MIL-STD 810C for shock and vibration.
    b. Line voltage units shall be UL recognized and CSA approved.

2.10 AUXILLARY CONTROL DEVICES:

A. Motorized dampers, unless otherwise specified elsewhere, shall be as follows:

1. Damper frames shall be 16 gauge galvanized sheet metal or 1/8" extruded aluminum with reinforced corner bracing.
2. Damper blades shall not exceed 8" in width or 48" in length. Blades are to be suitable for medium velocity performance (2,000 fpm). Blades shall be not less than 16 gauge.
3. Damper shaft bearings shall be as recommended by manufacturer for application.
4. All blade edges and top and bottom of the frame shall be provided with compressible seals. Side seals shall be compressible stainless steel. The blade seals shall provide for a maximum leakage rate of 10 CFM per square foot at 2.5" w.c. differential pressure.
5. All leakage testing and pressure ratings will be based on AMCA Publication 500.
6. Individual damper sections shall not be larger than 48" x 60". Provide a minimum of one damper actuator per section.

B. Control dampers shall be parallel or opposed blade types as scheduled on drawings.

C. Electric damper/valve actuators

1. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
2. Where shown, for power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing.
3. All rotary spring return actuators shall be capable of both clockwise or counter clockwise spring return operation. Linear actuators shall spring return to the retracted position.
4. Proportional actuators shall accept a 0-10 VDC or 0-20 ma control signal and provide a 2-10 VDC or 4-20 ma operating range.
5. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb. torque capacity shall have a manual crank for this purpose.
6. Actuators shall be provided with a conduit fitting and a minimum 1m electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.
7. Actuators shall be Underwriters Laboratories Standard 873 listed.
8. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque.

D. Control Valves

1. Control valves shall be two-way or three-way type for two-position or modulating service as scheduled or shown.
2. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:

    a. Water Valves:

        1) Two-way: 150% of total system (pump) head.
        2) Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.

    b. Steam Valves: 150% of operating (inlet) pressure.

E. Water Valves

1. Body and trim style and materials shall be in accordance with manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
2. Sizing Criteria:

    a. Two-position service: Line size.
    b. Two-way modulating service: Pressure drop shall be equal to twice the pressure drop through heat exchanger (load), 50% of the pressure difference between supply and return mains, or 34.5 kPa (5 psi), whichever is greater.
    c. Three-way modulating service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), 34.5 kPa (5 psi) maximum.
    d. Valves DN 15 (1/2 in.) through DN 50 (2 in.) shall be bronze body or cast brass ANSI Class 250, spring-loaded, PTFE packing, quick opening for two-position service. Two-way valves to have replaceable composition disc or stainless steel ball.
    e. Valves DN 65 (2 1/2 in.) and larger shall be cast iron ANSI Class 125 with guided plug and PTFE packing.

3. Water valves shall fail normally open or closed, as scheduled on plans, or as follows:

    a. Water zone valves—normally open preferred
    b. Heating coils in air handlers - normally open
    c. Chilled-water control valves - normally closed
    d. Other applications—as scheduled or as required by sequences of operation
4. Zone valves shall be sized to meet the control application and they shall maintain their last position in the event of a power failure.

F. Steam Valves

1. Body and trim materials shall be in accordance with manufacturer's recommendations for design conditions and service with linear ports for modulating service.

2. Sizing Criteria:

    a. Two-position service: pressure drop 10% to 20% of inlet psig
    b. Modulating service: 100 kPa (15 psig) or less; pressure drop 80% of inlet psig
    c. Modulating service: 101 to 350 kPa (16 to 50 psig); pressure drop 50% of inlet psig
    d. Modulating service: over 350 kPa (50 psig); pressure drop as scheduled on plans

G. Binary Temperature Devices

1. Low-voltage space thermostat shall be 24 V, bimetal-operated, mercury-switch type, with either adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C to 30°C (55°F to 85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
2. Line-voltage space thermostat shall be bimetal-actuated, open contact type, or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL

listed for electrical rating, concealed setpoint adjustment, 13°C to 30°C (55°F to 85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.

3. Low-limit thermostats. Low-limit airstream thermostats shall be UL listed, vapor pressure type, with an element of 6 m (20 ft) minimum length. Element shall respond to the lowest temperature sensed by any 30 cm (1 ft) section. The low-limit thermostat shall be manual reset only.

H. Wired Temperature Sensors

1. Temperature sensors shall be RTD or thermistor.
2. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m2 (10 ft2) of duct cross section.
3. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed. The well must withstand the flow velocities in the pipe.
4. Space sensors shall be equipped with setpoint adjustment, override switch, display, and/or communication port as shown on plans.
5. Provide matched temperature sensors for differential temperature measurement.

I. Wired Humidity Sensors

1. Duct and room sensors shall have a sensing range of 20% to 80%.
2. Duct sensors shall be provided with a sampling chamber.

J. Static Pressure Sensors

1. Sensor shall have linear output signal. Zero and span shall be field-adjustable.
2. Sensor sensing elements shall withstand continuous operating conditions plus or minus 50% greater than calibrated span without damage.
3. Water pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Sensor shall be complete with 4-20 ma output, required mounting brackets, and block and bleed valves. Mount in location accessible for service.
4. Water differential pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (DP) and maximum static pressure shall be 3,000 psi. Transmitter shall be complete with 4-20 ma output, required mounting brackets, and five-valve manifold. Mount in a location accessible for service.

K. Low Limit Thermostats

1. Safety low limit thermostats shall be vapor pressure type with an element 6m [20 ft] minimum length. Element shall respond to the lowest temperature sensed by any one foot section.
2. Low limit shall be manual reset only.

2.11 WIRING AND RACEWAYS:

A. General: Provide copper wiring, plenum cable, and raceways as specified in the applicable sections of this specification.

B. All insulated wire to be copper conductors, UL labeled for 90°C (194°F) minimum service.

C. Fiber Optic Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. The sheath shall be UL Listed OFNP in accordance with NEC Article 770. The optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125 µm.

PART 3 EXECUTION

3.0 SECTION INCLUDES

A. Examination:

B. Protection:

C. Coordination:

D. General Workmanship:

E. Field Quality Control:

F. Communication Wiring:

G. Fiber Optic Cable:

H. Installation Of Sensors:

I. Flow Switch Installation:

J. Warning Labels:

K. Identification Of Hardware And Wiring:

L. Controllers:

M. Programming:

N. Control System Checkout And Testing:

O. Cleaning:

P. Training:

3.1 EXAMINATION:

A. The Contract Documents shall be thoroughly examined for coordination of control devices, their installation, wiring, and commissioning. Coordinate and review mechanical equipment specifications, locations, and identify any discrepancies, conflicts, or omissions that shall be reported to the Architect/Engineer for resolution before rough-in work is started.

B. The BAS manufacturer shall inspect the jobsite in order to verify that control equipment can be installed as required, and any dis¬crepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.

3.2 PROTECTION:

A. The BAS installation contractor shall protect all work and material from damage by their work or personnel, and shall be liable for all damage thus caused.

B. The BAS manufacturer shall be responsible for their work and equipment until final inspection, testing, and acceptance. The BAS installing contractor shall protect their work against theft or damage, and shall carefully store material and equipment received on site that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.3 COORDINATION:

A. Site

1. Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
2. Coordinate and schedule work with all other work in the same area, or with work that is dependent upon other work, to facilitate mutual progress.

B. Submittals. Refer to the “Submittals,” section of this specification for requirements.

C. Test and Balance

1. The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
2. The contractor shall provide training in the use of these tools. This training will be planned for a duration of 4 hours.
3. In addition, the contractor shall provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.
4. The tools used during the test and balance process shall be returned to the contractor at the completion of the testing and balancing.

D. Life Safety

1. Duct smoke detectors required for air handler shutdown shall be supplied under Section 26100 of this specification. The contractor shall interlock smoke detectors to air handlers for shutdown as described in the Sequences of Operation for this project.
2. Smoke dampers and actuators required for duct smoke isolation are provided under Section 26100. The contractor shall interlock these dampers to the air handlers as described in the Sequences of Operation for this project as applicable.

3. Fire/smoke dampers and actuators required for fire rated walls are provided under another Section 26100. Control of these dampers shall be by 26100

E. Coordination with Controls Specified in Other Sections or Divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:

1. All communication media and equipment shall be provided as specified in the "Communication" section of this specification.
2. Each supplier of a controls product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequences of operation described in this section.
3. The Contractor shall coordinate and resolve any incompatibility issues that arise between the control products provided under this section and those provided under other sections or divisions of this specification.

3.4 GENERAL WORKMANSHIP:

A. Install equipment, piping, wiring/conduit, parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

C. Install all equipment in readily accessible locations as defined by National Electric Code (NEC). Control panels shall be attached to structural walls or properly supported in a free-standing configuration, unless mounted in equipment enclosure specifically designed for that purpose. Panels shall be mounted to allow for unobstructed access for service.

D. Verify integrity of all control wiring to ensure continuity and freedom from shorts and grounds prior to commencing the startup and commissioning procedures.

E. All control device installation and wiring shall comply with Contract Documents, acceptable industry specifications, and industry standards for performance, reliability, and compatibility. Installation and wiring shall be executed in strict adherence to local codes and standard practices referenced in Contract Documents.

3.5 FIELD QUALITY CONTROL:

A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Contract Documents.

B. BAS manufacturer shall continually monitor the field installation for building code compliance and quality of workmanship. All visible piping and or wiring runs shall be installed parallel to building lines and properly supported.

C. BAS installing Contractor(s) shall arrange for field inspections by local and/or state authorities having jurisdiction over the work.

3.6 COMMUNICATION WIRING:

A. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling.

B. Do not install communication wiring in raceway and enclosures containing Class 1 or other Class 2 wiring.

C. Maximum pulling, tension, and bend radius for cable installation, as specified by the cable manufacturer shall not be exceeded during installation.

D. Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.

E. When a cable enters or exits a building, a lighting arrestor must be installed between the line and ground.

F. All runs of communication wiring shall be unspliced length when the length is commercially available.

G. All communication wiring shall be labeled to indicate origin and destination.

3.7 FIBER OPTIC CABLE:

A. All cabling shall be installed in a neat and workmanlike manner. Minimum cable and unjacketed fiber bend radii as specified by cable manufacturer shall be maintained.

B. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post installation residual cable tension shall be within cable manufacturer's specifications.

C. Fiber optic cabinets, hardware, and cable entering the cabinet shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii as specified by cable manufacturer shall be maintained.

3.8 INSTALLATION OF SENSORS:

A. Sensors required for mechanical equipment operation shall be factory installed and wired as specified in mechanical equipment specifications. BAS manufacturer shall be responsible for coordinating these control devices and ensuring the sequence of operations will be met. Installation and wiring shall be in accordance with the BAS manufacturer's recommendations.

B. Sensors that require field mounting shall meet the BAS manufacturer's recommendations and be coordinated with the mechanical equipment they will be associated.

C. Mount sensors rigidly and adequately for the environment the sensor will operate.

D. Room temperature sensors shall be installed on concealed junction boxes properly supported by the block wall framing. For installation in dry wall ceilings, the low voltage sensor wiring can be installed exposed and must meet applicable National and Local Electrical Codes.

E. All wires attached to wall mounted sensors shall be sealed off to prevent air from transmitting in the associated conduit and affecting the room sensor readings.

F. Install duct static pressure tap with tube end facing directly down-stream of air flow.

G. Install space static pressure sensor with static sensing probe applicable for space installation where applicable.

H. Sensors used in mixing plenums, and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip.

I. All pipe mounted temperature sensors shall be installed in matched thermowells. Install all liquid temperature sensors with heat conducting fluid in thermal wells for adequate thermal conductance.

J. Wiring for space sensors shall be concealed in building drywall. EMT conduit is acceptable within mechanical equipment and service rooms.

K. Install outdoor air temperature sensors on north wall complete with sun shield at manufacturer’s recommended location and coordinated with Engineer.

3.9 FLOW SWITCH INSTALLATION:

A. Coordinate installation of flow switch with Mechanical Contractor who will be responsible for installing a thread o let in steel piping applications. Copper pipe applications will require the use CxCxF Tee, and no pipe extensions or substitutions will be allowed.

B. Mount a minimum of 5 pipe diameters upstream and 5 pipe diameters downstream, or two feet, whichever is greater, from pipe fittings and other inline potential obstructions.

C. Install in accordance with manufacturers' instructions, which will require proper flow direction, horizontal alignment with flow switch mounting on the top of pipe.

3.10 WARNING LABELS:

A. Permanent warning labels shall be affixed to all equipment that can be automatically started by the BAS system.

B. Permanent warning labels shall be affixed to all motor starters and all control panels that are connected to multiple power sources utilizing separate disconnects.

3.11 IDENTIFICATION OF HARDWARE AND WIRING:

A. All field wiring and cabling, including that within factory mounted, and wired control panels and devices for mechanical equipment, shall be labeled at each end within 2" of termination with a cable identifier and other descriptive information for troubleshooting, maintenance, and service purposes. BAS manufacturer to coordinate this labeling requirement with mechanical equipment manufacturer as it relates to controls.

B. Permanently label or code each point of field terminal strips to show the instrument or item served and correlate them to the BAS design drawings.

C. Identify control panels with minimum 1-cm letters on laminated plastic nameplates.

D. Identifiers shall match record documents. All plug-in components shall be labeled such that removal of the component does not remove the label.

3.12 CONTROLLERS:

A. Provide a separate DDC Controller for individual HVAC mechanical equipment. BAS manufacturer shall furnish and coordinate DDC controllers and control devices and ensure that installation and wiring adhere to BAS manufacturer's design recommendations. For those mechanical equipment units that do not have factory installed controls specified, the BAS manufacturer shall field mount controls and coordinate all installation and termination information to ensure the specified sequence of operations are met.

B. Building Controllers and Custom Application Controllers shall be selected to provide a minimum of 15% spare I/O point capacity for each point type (analog or digital) found at each location. If input points are not universal, 15% of each type is required. If outputs are not universal, 15% of each type is required. A minimum of one spare is required for each type of point used in each controller.

1. Future use of spare I/O point capacity shall require providing the field instrument and control device, field wiring, engineering, programming, and commissioning. No additional Controller boards or point modules shall be required to implement use of these spare points.

3.13 PROGRAMMING:

A. Provide sufficient internal memory for all controllers to ensure specified sequence of operations, alarming, trending, and reporting requirements are achieved. BAS manufacturer shall provide a minimum of 25% spare memory capacity for future use.

B. Point Naming: System point names shall be modular in design, allowing easy operator interface without the use of a written point index.

C. Software Programming

1. Provide programming for individual mechanical systems to achieve all aspects of the sequence of operation specified. It is the BAS manufacturer's responsibility to ensure all mechanical equipment functions and operates as specified in sequence of operations. Provide sufficient programming comments in controller application software to clearly describe each section of the program. The comment statements shall reflect the language used in the sequence of operations.

D. BAS Operator's Interface

1. When Operator Workstation is specified, provide color graphics for each piece of mechanical equipment depicting sufficient I/O to monitor and troubleshoot operation. Operator color

graphics shall include Chiller Plant, Cooling Tower System, Boiler Plant, Air Handling Units, Rooftop Units, VAV Terminal Boxes, Fan Coil Units, Unit Ventilators, Heat Exchangers, Exhaust Fans, etc. These standard graphics shall depict all points dynamically as specified in the points list and/or indicated in sequence of operation.

2. The BAS manufacturer shall provide all the labor necessary to install, initialize, start up, and trouble-shoot all operator interface software and their functions as described in this section. This includes any operating system software, the operator interface data base, and any third party software installation and integration required for successful operation of the operator interface.
3. As part of this execution phase, the BAS manufacturer shall perform a complete test of the operator interface.

3.14 CONTROL SYSTEM CHECKOUT AND TESTING:

A. Start-up testing. All testing in this section shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner’s representative is notified of the system demonstration.

1. The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service all of the instruments, controls, and accessory equipment furnished under this specification.
2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturer’s recommendations.
4. Verify all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starter, etc.) operate properly and normal positions are correct.
5. Verify all analog output devices (I/Ps, actuators, etc) are functional, that startand span are correct, and that direection and normal positions are correct. The contractor shall check all control valves and autoatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
6. Verify the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimal start/stop routimes.
7. Alarms and Interlocks

    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action.

3.15 CLEANING:

A. The BAS manufacturer’s installing contractor(s) shall clean up all debris resulting from their installation activities on a daily basis. The installation contractors shall remove all cartons, containers, crates, etc. under his control as soon as their contents have been removed. Waste shall

be collected and placed in a location designated by the Owner, Construction Manager, General Contractor, and/or Mechanical Contractor.

B. At the completion of work in any area, the installation contractor shall clean all of their work, equipment, etc., making it free from dust, dirt and debris.

C. At the completion of work, all equipment furnished under this Section shall be checked for paint damage. Any factory finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.16 TRAINING:

A. Provide minimum of (4) hours of operator training throughout the contract period. The training will be provided for personnel designated by the Owner.

B. These objectives will be divided into logical groupings; participants may attend one or more of these, depending on level of knowledge required:

1. Day-to-day BAS Operators
2. BAS Troubleshooting & Maintenance

END OF SECTION 15972

SECTION 159900 - TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic systems.

1.2 RELATED SECTIONS

A. Section 15010 - General Mechanical Requirements.

1.3 REFERENCES

A. AABC - National Standards for Total System Balance.

B. ADC - Test Code for Grilles, Registers, and Diffusers.

C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.

D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

1.4 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.

C. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance to be submitted 21 days before any installation work.

D. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required. Include detailed procedures, agenda, and sample report forms.

E. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.

F. Provide reports in letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

G. Test Reports: Indicate data on AABC National Standards for Total System Balance forms or NEBB.

H. Submit second test report for the second test which is to be done approximately 6 months after the first for opposite season operation.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 15010.

B. Record actual locations of flow measuring stations balancing valves and rough setting.

1.6 QUALITY ASSURANCE

A. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

B. The test and balance contractor shall schedule a meeting at the site with the design engineer and spot check 10 to 15% of the readings. If the readings are off by more than the specified tolerances, the complete building test and balance shall be redone and a new report submitted.

1.7 QUALIFICATIONS

A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience and certified by AABC, NEBB or Register Professional Engineer with a minimum of 5 year experience in Test and Balance.

B. Perform Work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor or Register Professional Engineer with a minimum of 5 year experience in Test and Balance.

1.8 SEQUENCING

A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

B. The Test and Balance Contractor shall work with Controls Contractor as required to adjust the dampers to provide the air flows as required.

1.9 SCHEDULING

A. Schedule work as required to perform the work required.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:

1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.

B. Beginning of work means acceptance of existing conditions.

3.2PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.3INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 10 percent of design to space. Adjust outlets and inlets in space to within plus or minus 5 percent of design.

C. Hydronic Systems: Adjust to within plus 5 percent or minus 0 percent of design.

3.4ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

E. At final inspection, recheck random selections of data recorded in report. Recheck points or

areas as selected and witnessed by the Owner.

F. Check and adjust systems approximately six months after final acceptance and submit report for opposite season operation.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide design supply, return, and exhaust air quantities.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure.

3.6 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.7SCHEDULES

A. Equipment Requiring Testing, Adjusting, and Balancing

HVAC Pumps
Packaged Boiler
Air Cooled Water Chillers
Packaged Roof Top Heating/Cooling Units
Unit Air Conditioners
Computer Room Air Conditioning Unit
Terminal Heat Transfer Units
Air Handling Units, Include Sound Testing
Fans
Duct Sound Attenuator
Air Inlets and Outlets
Outside Air Unit

END OF SECTION

SECTION 16000 - ELECTRICAL GENERAL REQUIREMENTS

PART I - GENERAL

1. RELATED DOCUMENTS: The Electrical General Requirements are supplementing and applicable to Division 16 Sections and shall apply to all phases of work specified herein, shown on the Drawings, or required to provide a complete installation of electrical systems. Section 16 is sub-divided for convenience only. Associated work specified in other Sections:

16050 – Basic Electrical Materials and Methods
16100 – Wiring Methods
16200 – Electrical Power and Distribution
16289 – Transient Voltage Surge Suppression System
16500 – Lighting
16721 – Fire Alarm/Life Safety System
16760 – Intercom System
16800 – Interior Lighting Controls
15010 – HVAC Control

2. REGULATORY REQUIREMENTS:

A. STANDARDS AND CODES: The electrical installation shall comply with all applicable building codes: local, state, federal ordinances, and the 2002 edition of the National Electrical Code. In case of a discrepancy among these applicable regulatory codes and ordinances, the most stringent requirement shall govern. The Contractor shall notify the TPM in writing of any such discrepancy. Should the Contractor perform any work that does not comply with the applicable regulatory codes and ordinances he shall bear all cost arising in correcting the deficiencies. Application standards and codes shall include all local ordinances, all state laws, and the applicable requirements of the following:

(1) National Electrical Manufacturer's Association - NEMA
(2) The National Fire Alarm Code – NFPA 72, 2002 Edition
(3) State Requirements for Educational Facilities - SREF
(4) The Life Safety Code – NFPA 101, 2003 Edition
(5) American National Standards Institute - ANSI
(6) Florida Building Code, Latest Edition
(7) Underwriters' Laboratories, Inc. – UL
(8) National Fire Protection Association – NFPA (latest editions)

Any codes that are not mentioned above that are required by the local jurisdiction, do not relinquish responsibility of the contractor to follow codes specified by the local jurisdiction.

B. SPECIFICATIONS AND DRAWINGS: The drawings and these specifications complement each other. What is called for by one shall be as binding as if called for by both. Omissions from the drawings and specifications of details of work which are evidently necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such work. In any case of discrepancy in

the figures or catalog numbers, the matter shall be submitted to the TPM, who shall promptly make a determination in writing. Any adjustment by the Contractor shall be at the Contractor's own risk and expense. Electrical drawings are diagrammatic only. Do not scale these drawings. All equipment shall be installed in accordance with manufacturer's recommendations and any conflicting data shall be verified before bidding.

C. FEES, PERMITS, AND INSPECTIONS: This Contractor shall secure and pay for all permits, and inspections required on work performed under this section of the Specifications. He shall assume full responsibility for all assessments and taxes necessary for the completion and acceptance of the work.

D. LETTERS CERTIFYING COMPLIANCE AND REVIEW: The Contractor's bid shall be accompanied by a letter stating that these Documents will be revised, as required by any legal authority having jurisdiction and by any serving utility, with no additional cost to the Owner. As soon as practical after bidding, and before any work is commenced, the Contractor shall meet with all legal authorities having jurisdiction, review all materials and details of this project and agree on any required revisions.

A letter shall be written to the TPM listing the names, dates, places of such review, and the revisions required (at no additional cost). A copy of the letter shall also be sent to the reviewing authority. The Contractor shall also meet with each serving utility and repeat the above procedure. A letter certifying each meeting shall be written also with the information as described above. The letter from the telephone and cable television utilities shall address approval for site and internal building cable types.

The Contractor shall after completion of the work, furnish the TPM a certificate of final inspection and approval from the applicable local inspection department. Make necessary changes to plans and specifications to meet code standards at no additional cost to the Owner.

3. EXISTING SITE CONDITIONS: All utilities, existing system and conditions shown on the plans as existing is approximate, and the Contractor shall verify before any work is started. Before submitting proposals, each bidder should visit the site and fully familiarize himself with all job conditions and shall be fully informed as to the extent of his work. No consideration will be given after bid opening date for alleged misunderstanding as to the requirements of work involved in connecting to the utilities or as to requirements of materials to be furnished. Part of the work specified is to Fire Caulk all conduits entering and leaving the new fire rated hallways. Also, all wires and cables not in conduit shall be sleeved and fire caulked to match the fire rating of the adjacent wall.

4. INTERRUPTIONS AND SERVICE

A. SCHEDULED INTERRUPTIONS: Planned interruptions of utilities service, to any facility affected by this contract, shall be carefully planned and approved by TPM at least ten (10) days in advance of the requested interruption. The Contractor shall not interrupt services until the TPM has granted specific approval. The request shall indicate services to be affected, date and time of interruption and duration of outage. Request for interruption of service will not be approved until all equipment and materials required for the completion of that particular phase of work are on the job site. The work may have to be scheduled after normal working hours.

B. ACCIDENTAL INTERRUPTIONS: All excavation and/or remodeling work required shall be performed with care so as not to interrupt other existing services (water, gas, electrical, sewer, sprinklers, etc.). If accidental utility interruption resulting from work performed by the Contractor occurs, service shall be immediately restored to its original condition without delay, by and at the expense of the Contractor, using skilled workmen of the trade required.

C. MAINTAINING SERVICE:

(1) Any existing service (or operating system) which must be interrupted for any length of time shall be supplied with a temporary service if necessary for continuation of the normal operation of this facility.

(2) Any existing system or part of an existing system currently in operation shall remain so after all additions or renovations are made and all work is completed.

5. COORDINATION:

A. COORDINATING WITH OTHER CRAFTS: It shall be the responsibility of the Contractor to cooperate and coordinate with all other crafts working on this project. This Contractor shall do all cutting, trenching, backfill and structural removals to permit entry of the electrical system components. The General Contractor shall do all patching and finishing. The TPM's representative shall render a decision in writing as to space allotment in congested areas. No claims for "extras" due to such decisions shall be allowed, even though the work has already been installed. When the Contractor submits for approval any item or equipment, he shall determine for himself whether or not it will fit the space provided. If, after installation of any equipment, wiring or other items, it is determined that ample maintenance or passage space has not been provided, then the Contractor shall rearrange this work and/or furnish other equipment even though the equipment installed has been approved. A 1/2" = 1'0" scaled drawing of the main building equipment rooms along with elevations of each wall shall be submitted with the electrical shop drawings showing the proposed location of all equipment in each room.

B. MECHANICAL EQUIPMENT:

(1) The Contractor shall furnish all branch circuit wiring to motors and control panels or centers of heating and air conditioning equipment including disconnects, receptacles, switches, and appurtenances to which the system at the units may be connected, to provide a complete system of wiring for power. Control equipment and control circuit wiring is specified in the Mechanical Section. The electrical contractor shall make all power terminations to equipment supplied by others.

(2) Control devices to be included in the branch circuit, except those furnished integral with the equipment, will be delivered by the Heating and Air Conditioning Contractor and installed by the Electrical Contractor.

C. EQUIPMENT FURNISHED UNDER OTHER SECTIONS: This Contractor shall furnish and install, complete electrical roughing-in and connections to all equipment furnished under other sections and indicate on drawings. This includes all outlets as shown on mechanical and electrical drawings. All such equipment shall be set in place as work of other sections.

6. MATERIALS AND EQUIPMENT APPROVAL:

A. PRIOR-SUBMITTALS: The Contractor shall base his proposal on the materials specified herein and on the drawings. Reference to a particular product by manufacturer, trade name, or catalog number establishes the quality standards of material and equipment required for this installation and is not intended to exclude products equal in quality and similar design. The TPM reserves the sole right to decide the equality of materials proposed for use in lieu of these specified. It shall be the Contractor's responsibility to furnish the information and data sufficient to establish the quality and utility of the items in question, including furnishing of samples if required. If other equipment manufacturers determine that their equipment will fit in the space and meet the recommended clearances, suit all job conditions, equal or exceed the quality of the specified items, then a request may be made in writing to the TPM at least ten (10) days prior to bid date for permission to be included in the approved equipment list. All data required for evaluation shall accompany the above letter.

B. SUBMITTALS:

(1) Shop Drawings: The Contractor shall submit a list of items proposed for use. He shall also submit catalog data and shop drawings on proposed systems and their components, panelboards, safety switches, starters and contactors, transformers, lighting fixtures, and wiring devices. Where substitutions alter the design or space requirements, the Contractor shall defray all items of cost for the revised design and construction including costs to all allied trades involved. Data shall be submitted within thirty (30) days after the contract is awarded. Provide eight (8) copies of shop drawings as a minimum unless the General Conditions require a greater number of copies. Each submittal data section shall be covered with an index sheet listing Contractor, supplier, etc., and an index to the enclosed submittals.

(2) As-Built Drawings: Upon completion of the project, the Contractor shall furnish a complete set of the drawings which formed a part of the contract and include all revisions, sketches, etc., which may have been required during the construction.

(3) Operating and Maintenance Manuals: At completion of the work, furnish three (3) copies of written operation instructions which shall include manufacturer's descriptive bulletins, operating and maintenance manuals and parts lists of all equipment installed. Also include in such instructions, the specified size and capacity ratings of all equipment installed. Each set of instructions shall be assembled into a suitable loose-leaf type binder and presented to the TPM for delivery to the Owner.

(4) Each major section of submittals such as power, equipment, lighting equipment, fire alarm, etc., shall be secured in a booklet or stapled with a covering index which lists the following information:

a. General contractor w/phone number and project manager.
b. Sub-contractor w/phone number and project manager.
c. Supplier of equipment w/phone number and person responsible for this project.

d. Index of each item covered in submittal and model number.
e. Any deviation from contract documents shall be specifically noted on submittal cover index and boldly on specific submittal sheet.

(5) Mechanical, Plumbing, Fire Sprinkler, and Electrical Coordination:

The electrical power equipment submittals shall be accompanied by a letter verifying coordination of electrical services for all mechanical, plumbing, and fire protection sprinkler equipment requiring power. The letter, addressed to the general contractor, shall include the following information:

a. Mechanical, plumbing, and fire sprinkler items that require power
b. The full load amps of each item
c. Whether the item is single or three phase
d. The minimum and maximum overcurrent protection
e. The proposed breaker size
f. The proposed circuit
g. The number of electrical connections

The letter should be in an organized format so that it is easy to read and decipher information by all parties involved. All relevant contractors (mechanical, plumbing, and fire sprinkler) shall review this letter and sign it before delivery to the general contractor.

7. PROTECTION AND CLEANING OF PRODUCTS: Take necessary precautions to protect all material, equipment, apparatus and work from damage before, during, and after installation. Failure to do so to the satisfaction of the TPM will be sufficient cause for the rejection of the material, equipment or work in question. Contractor is responsible for the safety and good condition of the materials installed until final acceptance by the owner. Conduit openings shall be capped or plugged during installation to maintain cleanliness. Fixtures and equipment shall be tightly covered and protected against dirt, moisture, chemical and mechanical injury. At the completion of the work the fixtures, material and equipment shall be thoroughly cleaned and delivered in condition satisfactory to the TPM.

8. WORKMANSHIP: All work shall be executed in a neat and substantial manner by skilled workman, well qualified, and regularly engaged in the type of work required. Substandard work shall be removed and replaced by the Contractor at no cost to the Owner.

9. TESTING AND BALANCING: Make tests that may be required by the Owner or the TPM in connection with the operation of the electrical system in the buildings. Balance all single-phase loads connected to all panelboards in the buildings to insure approximate equal divisions of these loads on the main secondary power supply serving the buildings. All tests shall be made in accordance with the latest standards of the IEEE and the NEC. The installation shall be tested for performance, grounds and insulation resistance. A "megger" type instrument shall be used. Contractor shall perform circuit continuity and operational tests on all equipment furnished or connected by Contractor. The tests shall be made in the presence of the TPM or his representative. The Contractor shall notify the TPM at least twenty-four (24) hours in advance of tests. The Contractor shall provide all testing equipment and all costs shall be borne by him. Written reports shall be made of all tests. All faults shall be corrected immediately.

A letter shall be written giving the following:

A. Measured amps on each phase of each panel.
B. Resistance to ground of each grounding electrode.
C. Measured voltage phase to phase and phase to neutral at each panel.
D. Ground continuity and polarity instrument used.

10. OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Upon completion of the work and at the time designated, the services of one project engineer shall be provided by the Contractor to instruct the representative of the Owner in the operation and maintenance of the systems.

11. GUARANTEE AND SERVICE: Upon completion of all tests and acceptance, the Contractor shall furnish the Owner a written guarantee covering the electrical work done for a period of one (1) year from date of acceptance. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Upon notice from the TPM or the Owner, the Contractor shall, during the guarantee period, rectify and replace any defective material or workmanship and repair any damage caused thereby without additional cost.

END OF SECTION 16000

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

PART I - GENERAL

1. SECTION INCLUDES:

A. Supports
B. Excavation, Trenching, and Backfilling
C. Cutting and Patching
D. Equipment Connection
E. Identification of Equipment
F. Cleaning and Painting
G. Demolition
H. Salvaged Materials
I. Grounding and Bonding

PART II - PRODUCTS

1. SUPPORTS:

A. FRAMING STEEL: Galvanized or painted rolled steel of standard shapes and sizes.

B. MANUFACTURED CHANNEL: Hot dipped galvanized with all hardware required for mounting as manufactured by Unistrut, Steel City, or approved equal.

C. MISCELLANEOUS HARDWARE: Standard sizes treated for corrosion resistance.

2. IDENTIFICATION:

A. NAMEPLATES: Laminated black micarta with ¼" high engraved white letters.

B. PANEL DIRECTORIES: Typewritten under plastic cover.

C. WIRE AND CABLE MARKERS: Cloth, split sleeve, or tubing type.

D. GROUNDING MATERIALS

(1). GROUND ROD: 16 feet x ¾" diameter, copper clad steel, sectional driven.

(2). GROUND CONNECTORS: Approved ground clamp manufactured of cast bronze construction with matching bolts, nuts, and washers.

(3). EXOTHERMIC WELDS: Materials shall be from the same source. Welding process shall be Cadweld or approved equal.

(4). GROUNDING CONDUCTORS: Green colored and coded insulated copper (#12 AWG minimum) or bare soft drawn copper as indicated on Drawings.

PART III - EXECUTION

1. INSTALLATION: Products shall be installed in accordance with manufacturer's instructions.

A. SUPPORT SYSTEMS shall be sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.

(1) Fasten hanger rods, conduit clamps, and outlet junction boxes to building structure using precast insert system, expansion anchors, preset inserts, beam clamps, or spring steel clips.

(2) Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion and anchors on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

(3) Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.

(4) Do not use powder-actuated anchors.

(5) Do not drill structural steel members without written consent from the Architect.

(6) Fabricate supports from structural steel or steel channel.

(7) Install surface mounted cabinets and panelboards with minimum of four anchors.

(8) Provide steel channel supports to stand cabinets one inch off wall in wet locations.

(9) Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

(10) Install freestanding electrical equipment on concrete pads. Concrete pad shall be 4" high and 4" larger than footprint of electrical equipment.

B. EXCAVATING, TRENCHING, AND BACKFILLING shall be accomplished as indicated on the Drawings or where required to install systems and/or equipment.

(1) Trenches for all underground conduits or equipment shall be excavated to the required depths. Where soft, wet, or unstable soil is encountered, the bottom of the trench shall be filled with 6 inches of compacted gravel and sand fill. All trench bottoms shall be tamped hard. Trenches shall be shored as required to meet OSHA requirements and general safe working conditions.

(2) After conduits or equipment have been inspected and approved by the Architect and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris. Material for backfilling shall consist of the

excavation, or borrow of sand, gravel, or other materials approved by the Engineer and shall be free of trash, lumber or other debris. Backfill shall be placed in horizontal layers, not exceeding 9 inches in depth and properly moistened to approximate optimum requirements. Each layer shall be compacted by hand, or machine tamped to a density equivalent to surrounding soil. Backfill shall be brought to suitable elevation above ground to provide for anticipated settlement and shrinkage. All paving broken up shall be repaired and returned to the original condition.

C. CUTTING AND PATCHING: This Contractor shall provide all cutting, digging, etc., incident to his work and shall make all required repairs thereafter to the satisfaction of the Engineer, but in no case shall the Contractor cut into any major structural element, beam, or column without written approval of the Engineer.

(1) Pavements, sidewalks, roads, curbs, walls, ceilings, floors, and roofs shall be sawcut, patched, repaired and/or replaced as required to permit the installation of the electrical work. Existing concrete floors and other slabs, which require vertical piercing for installation of conduit raceways shall be neatly core drilled. The Contractor shall carefully lay out his drilling in advance and arrange it to minimize exposed work.

(2) The Contractor shall bear the expense of all cutting, patching, painting, repairing, or replacing of the work of other trades required because of his fault, error, or tardiness or because of any damage done by him.

(3) All patching, and finishing shall be performed by the General Contractor at this Contractor’s expense.

D. Make electrical connections to equipment in accordance with equipment manufacturer’s instructions.

(1) Verify that wiring and outlet rough-in work is complete and that equipment is ready for electrical connection, wiring, and energization.

(2) Make wiring connections in control panel or in wiring compartment of pre-wired equipment. Provide interconnecting wiring where indicated.

(3) Install and connect disconnect switches, controllers, control stations, and control devices as indicated.

(4) Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit in damp or wet locations.

(5) Install pre-fabricated cord set where connections with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.

(6) Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.

E. Identify electrical distribution and control equipment, and loads served, to meet regulatory requirements and as specified herein.

(1) Degrease and clean surface to receive nameplates.

(2) Secure nameplates to equipment fronts using screws or rivets with edges parallel to equipment lines.

(3) Each new and existing panel shall have an external nameplate. Electric meters, disconnect switches, starters or similar devices shall have a micarta engraved nameplate mechanically affixed indicating the load served and the location, such as "A/C 2" or "A/C 3 above ceiling". Letters shall be ¼" white on a black background. Panels shall be designated in this manner:

"Panel A
120/208 Volts
3 Phase 4 Wire
Served from Panel MP"

(4) Panel directories shall accurately indicate load served and location of load.

(5) Engrave plates as indicated on the Drawings.

F. Raceway junction boxes for each system shall be identified by painting the inside of the junction box cover for exposed work and both sides of the covers for concealed work according to the following code:

Receptacle Circuits	Black
120 V. Lighting Circuits	White
120/208 V. Power & Misc.	Green
Fire Alarm System	Red
Intercom System	Gray

If the established color code at this site conflicts with the above, the contractor shall so state in a letter outlining his proposed colors to maintain conformity

G. Install wire markers on each conductor in panelboard gutters, boxes, and at load connections.

(1) Use distribution panel and branch circuit or feeder number to identify power and lighting circuits.

(2) Use control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings to identify control wiring.

H. CLEANING AND PAINTING: The respective Contractors for the various phases of work shall clear away all debris, surplus materials, etc., resulting form their work or operations, leaving the job and equipment furnished in the clean first class condition.

(1) All fixtures and equipment shall be thoroughly cleaned of plaster, stickers, rust, stains and other foreign matter or discoloration, leaving every part in an acceptable condition ready for use.

(2) The Contractor shall refinish and restore to the original condition and appearance, all electrical equipment, which has sustained damage to manufacturer's prime and finish coats or enamel or paint. Materials and workmanship shall be equal to the requirements described for other painting.

(3) Where exposed conduits or raceways are shown or permitted, they shall be painted to match adjacent finished surfaces.

I. DEMOLITION: All existing systems and conditions shown on the plans are approximate. The existing electrical circuits of power, receptacles, lighting, etc., being removed MAY NOT BE SHOWN on these documents, but are to be removed as required to build this project and to permit new finishes, walls, etc. The contractor shall field-verify all conditions prior to beginning any work and shall notify the Architect of discrepancies. Failure to do so indicates that the contractor accepts the conditions as they exist and shall perform any additional work necessary to perform the work as shown and specified.

(1) Conductors: Remove abandoned wiring to the source of supply. All existing conductors shown to be removed and are not to be re-used on this project site.

(2) Conduit: Remove exposed abandoned conduit and boxes including conduit and boxes above accessible ceilings. Any existing conduit runs may be re-used concealed in place if the contractor through the Engineer's consent determines that it is in good condition. The contractor shall bear all costs, expenses incurred while attempting to re-use an existing conduit that is unable to receive the new work.

(3) Circuits: If any existing conductor run is encountered which serves a critical load not indicated on the new wiring shown, it shall be brought to the attention of the Owner's Representative for evaluation before removal. When a load is to be removed and its continuing circuit feeds other loads, the wiring shall be made continuous to the remaining loads. No circuit continuity shall be lost. Care shall be taken to identify the conduit, feeder, or branch circuit as serving the demolition area before it is de-energized.

(4) Outlets: Disconnect abandoned outlets and remove devices. Provide blank cover for abandoned outlets that are not removed.

(5) Panelboards: Replace existing panelboards shown on plans with new panelboards in the same location. Install new breakers to match existing breaker size and reconnect existing circuits to new breakers in new panel. All panelboards in hallways where work is being done, and not being removed, shall be fire caulked around openings in wall to match the fire rating of the wall.

(6) Lighting Fixtures: Disconnect and remove abandoned luminaries, brackets, stem, hangers, and other accessories.

(7) Equipment being removed by Others: Remove all connections, disconnect switches, starters, and relays associated with equipment being removed by other contractors.

J. SALVAGED MATERIALS: Materials and equipment removed from the construction site shall remain the property of the Owner. This contractor shall remove and store materials until directed by the Owner as to disposition. Materials may be salvaged by the Owner at his discretion or disposed of by the contractor as directed by the Owner.

K. Except where specifically indicated otherwise, all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, and service neutral of the electrical system shall be grounded.

(1) Equipment grounding shall be accomplished by installing a separate grounding conductor in each raceway of the system. The Conductor shall be provided with a distinctive green insulation or marker and shall be sized in accordance with Article 250 of the National Electrical Code.

(2) The electrical system grounding electrode connection shall be made at the main service equipment and shall be extended to the point of entrance of the metallic cold water service. A suitable ground clamp shall make connection to the water pipe. If flanged pipes are encountered, connection shall be made on the street side of the flange connection. If the metallic water service is coated with an insulating material or there is no metallic water service to the building, ground connection shall be made to additional ground rods as required by resistance tests, at the exterior of the building driven full length into the earth.

(3) The maximum resistance of the driven ground shall be tested with a ground resistance Megger and shall not exceed 25 ohms under normally dry conditions. If this cannot be obtained with a single rod, additional or parallel rods shall be installed 7’-6” on center until 25 ohms or less is achieved without connection to the building water piping. A typewritten test report shall be written.

END OF SECTION 16050

SECTION 16100 - WIRING METHODS

PART I - GENERAL

1. RELATED DOCUMENTS:

A. Section 16000 – Electrical General Requirements, apply to the work specified in this Section, with additions and modifications specified herein.

2. SECTION INCLUDES:

A. Conduit and Conduit Fittings
B. Electrical Boxes and Fittings
C. Wireway
D. Surface Non-Metallic Raceway
E. Service Fittings
F. Wire and Cable
G. Wiring Devices

PART II - PRODUCTS

1. CONDUIT AND FITTINGS:

A. CONDUIT:

(1) Metal conduit: Galvanized steel.

(2) Metal tubing: Galvanized steel.

(3) Flexible Conduit: Steel.

(4) Liquid-tight Flexible Conduit: Flexible steel conduit with PVC jacket.

(5) Plastic Conduit and Tubing: NEMA TC 2; PVC. Use Schedule 40 conduit.

B. CONDUIT FITTINGS:

(1) Conduit Fittings and Conduit Bodies: NEMA FB 1. Conduit fittings to be steel threaded type.

(2) Tubing Fittings: NEMA FB 1. Tubing fittings to be steel compression type for conduit up to 2” in diameter and set screw type for conduit 2-1/2” and larger.

(3) Flexible Conduit Fittings: NEMA FB 1. Flexible conduit fittings to be steel set screw or screw-in type.

(4) Liquid-tight Flexible Conduit Fittings: NEMA FB 1. Liquid-tight flexible conduit fittings to be steel compression type.

(5) Plastic Fittings and Conduit Bodies: NEMA TC 3.

2. ELECTRICAL BOXES:

A. BOXES:

(1) Sheet Metal: NEMA OS 1; galvanized steel 4" or 4-11/16" square. Provide galvanized plaster/tile ring for recessed outlet boxes.

(2) Cast Metal: Aluminum or cast ferroalloy, deep type, gasketed cover, threaded hubs.

(3) Nonmetallic: NEMA OS 2.

B. FLOOR BOXES for Installation in Cast-in-Place Concrete Floors: Fully adjustable, cast iron.

C. LARGE ENCLOSURES: NEMA 250; Type 4, steel enclosures with manufacturer's standard enamel finish and cover, held closed screws.

D. LARGE CAST METAL BOXES:

(1) Surface-mounted Type: NEMA 250; Type 4 and Type 6, flat-flanged, surface mounted junction box; galvanized cast iron or cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

(2) Underground Type: NEMA 250; Type 4 flanged, recessed cover box for flush mounting; galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screw.

3. WIREWAY:

A. ENCLOSURE: General purpose or raintight type with knockouts.

B. COVER: Screw type with full gasketing.

C. FITTINGS: Lay-in type with removable cover and drip shield for outdoor installation.

D. FINISH: Rust inhibiting primer coating with enamel finish.

4. SURFACE NON-METALLIC RACEWAY:

A. EQUAL MANUFACTURERS: Panduit, Wiremold, or Hubbell Premise.

B. MATERIAL: The raceway and all system components must be UL Listed and exhibit nonflammable self-extinguishing characteristics, tested to comparable specifications of UL94V-0.

C. RACEWAY: Two-piece design with a base and snap-on cover. The raceway shall be available with and without multiple wiring channels formed by adding divider walls in the base. The raceway shall be capable of having one, two, or three compartments.

D. FITTINGS: A full compliment of fittings must be available and supplied to provide a complete raceway system including but not limited to flat, internal and external elbows, tees, entrance fittings, cover clips, and end caps. The fittings shall overlap the cover and base to hide uneven cuts.

E. COLOR: The raceway shall be available in a variety of colors.

5. SERVICE FITTINGS:

A. FLUSH FLOOR BOX COVERS:

(1) Cover material: Brass.

(2) Duplex Convenience Receptacle: Duplex flap opening hinged with holding screw.

(3) Communications: 2-1/8" X 1" combination threaded opening.

(4) Provide brass finish protective rings and carpet flanges.

6. WIRE AND CABLE

A. BUILDING WIRE:

(1) Feeder and Branch Circuits 10 AWG and Smaller: Copper, solid conductors, 600 volt insulation, THWN.

(2) Feeder and Branch Circuits 8 AWG and Larger: Copper, stranded (except as permitted or required by the NEC) conductors, 600 volt insulation, THHN, THHW, or THWN unless specified on drawings.

(3) Control Circuits: Copper, stranded conductors, 600 volt insulation, THHN, THHW, or THWN.

B. REMOTE CONTROL SIGNAL CABLE:

(1) Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated 60 degree C, individual conductors twisted together, shielded, and covered with PVC jacket.

(2) Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 60 degree C, individual conductors twisted together, shielded, and covered with PVC jacket; UL listed.

C. CORDS: Oil – resistant thermoset insulated multi – conductor flexible cord with identified equipment grounding conductor, suitable for extra hard usage in damp locations.

7. WIRING DEVICES AND WALLPLATES:

A. MANUFACTURERS:

(1) Hubbell.

(2) Pass and Seymour.

(3) Slater.

B. WALL SWITCHES: AC general use, quiet – operating snap switch rated 20 amperes and 120/277 volts AC, with plastic toggle handle.

(1) Single Pole Switch: Hubbell 1221

(2) Double Pole Switch: Hubbell 1222

(3) Three Way Switch: Hubbell 1223

(4) Four Way Switch: Hubbell 1224

(5) Pilot Light Type: Lighted handle, Model 1221-PL manufactured by Hubbell.

(6) Color to be selected by Architect from standard colors.

C. RECEPTACLE:

(1) Convenience Receptacle Configuration: Type 5-20R, plastic face. Model 5362 manufactured by Hubbell.

(2) Specific Purpose Receptacle: Configuration indicated on Drawings with black plastic face.

(3) Provide straight-blade receptacles to NEMA WD 1.

(4) Provide locking-blade receptacles to NEMA WD 5.

(5) GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter. Model GF-5362 manufactured by Hubbell.

(6) Color to be selected by Architect from standard colors.

D. WALL DIMMER: Rotary dial type. Model C-2000 manufactured by Lutron. Rating of 2000 watts at 120 volts, AC.

E. DECORATIVE COVER PLATE: Stainless steel.

F. WEATHERPROOF COVER PLATE: Gasketed cast metal with hinged gasketed device covers rated raintight while in use on accordance with Article 410-57 of the National Electrical Code.

F. ATTACHMENT PLUG CAP: Match receptacle configuration provided for equipment connection.

PART III - EXECUTION

1. EXAMINATION AND PREPARATION:

A. Examine supporting surfaces to determine that surfaces are ready to receive work.

B. Electrical boxes shown on Drawings are approximate locations unless dimensioned. Obtain verification from Architect/Engineer of locations of outlets prior to rough-in. Outlets may be relocated to a distance of ten feet prior to rough-in with no additional cost to the Owner.

C. Verify that interior of building has been physically protected from weather.

D. Verify that mechanical work which is likely to injure conductors has been completed.

G. Completely and thoroughly swab raceway system before installing conductors.

2. INSTALLATION:

A. Use conduit and tubing for raceways in the following locations:

(1) Underground Installations: Schedule 40PVC with rigid steel bends. Rigid steel conduit shall be painted with two coats of epoxy asphaltic paint.

(2) Installations in Concrete: Schedule 40 PVC with rigid steel bends with approval from Structural Engineer. Rigid steel conduit shall be painted with two coats of epoxy asphaltic paint.

(3) Exposed Outdoor Locations: Galvanized rigid steel conduit.

(4) Wet Interior Locations: Rigid steel conduit or electrical metallic tubing. Use threaded or raintight fittings for conduit.

(5) Concealed Dry Interior Locations: Rigid steel conduit or electrical metallic tubing.

(6) Exposed Dry Interior Locations: Rigid steel conduit or electrical metallic tubing.

(7) Feeders: Galvanized rigid steel conduit on all feeders.

B. Size raceways for conductor type installed.

(1) Minimum Size Conduit: ¾" in underground locations, ½" in all other locations.

(2) Maximum Size Conduit in Slab Above Grade: 1 – inch; do not route conduits larger than ¾" to cross each other.

C. Arrange conduit and tubing to maintain headroom and to present a neat mechanical appearance.

(1) Route exposed raceway parallel and perpendicular to walls and adjacent piping.

(2) Maintain minimum 6 inch clearance to piping and 12 inch clearance to heat surfaces such as flues, steam piping, and heating appliances.

(3) Maintain required fire, acoustic, and vapor barrier rating when penetrating walls, floors, and ceilings.

(4) Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket.

(5) Group in parallel runs where practical. Use rack constructed of steel channel. Maintain spacing between raceways or de-rate circuit ampacities to NFPA 70 requirements.

(6) Use conduit hangers and clamps; do not fasten with wire or perforated pipe straps.

(7) Use conduit bodies to make sharp changes in direction.

(8) Terminate all conduits with insulated bushings.

(9) Use suitable caps to protect installed raceway against entrance of moisture and dirt.

(10) Provide a pull cord in all empty raceways.

(11) Install expansion joint fittings where raceway crosses building expansion joints.

(12) Install plastic conduit and tubing in strict accordance with the manufacturer's recommendations. When plastic conduit is installed, use galvanized rigid elbows for 90 degree bends.

D. Install electrical boxes as shown on the Drawings, and as required for splices, taps, wire pulling, equipment connections and regulatory requirements.

(1) Use cast outlet box in exterior locations, wet locations, and exposed interior locations

(2) Use large enclosure for interior pull and junction boxes larger than 12 inches in any dimension.

(3) Locate and install electrical boxes to allow access. Provide access panels if required.

(4) Locate and install electrical boxes to maintain headroom and to present a neat mechanical appearance.

(5) Install pull boxes and junction boxes above accessible ceilings or in unfinished areas.

(6) Provide knockout closure for unused openings.

(7) Align wall-mounted outlet boxes plumb and level for switches, and similar devices.

(8) Coordinate mounting heights and locations of outlets above counters and backsplashes

(9) Install lighting outlets to locate luminaries as shown on the Drawings.

E. Use recessed outlet boxes in finished areas where indicated.

(1) Secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness, and plaster/tile ring installation.

(2) Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

(3) Locate boxes in masonry walls to require cutting corner only. Coordinate masonry cutting to achieve neat openings for boxes

(4) Do not install boxes back-to-back in walls; provide 6 inch separation, minimum. In acoustic-rated walls provide 24 inch separation minimum.

(5) Do not damage insulation.

F. Install wireway in accordance with manufacturer’s instructions.

(1) Bolt wireway to wall using two-piece hangers or steel channels fastened to the wall or on a self-supporting structure. Install level.

(2) Mount raintight gutter in horizontal position only.

G. Install non metallic surface raceway in accordance with manufacturer’s instructions.

(1) Use flat head screws or clips and straps suitable for the purpose, to fasten channel to surfaces. Mount plumb and level.

(2) Use insulated bushings and inserts at connections to outlets and corner fittings.

(3) Use fittings and accessories designed for use with the raceway system.

H. Install service fittings in accordance with manufacturer's instructions.

I. Interface outlet boxes, service fittings, floor boxes, etc. with connection of equipment.

J. WIRING METHODS:

(1) Concealed Interior Locations: Building wire in raceway.

(2) Exposed Interior Locations: Building wire in raceway.

(3) Above Accessible Ceilings: Building wire in raceway.

(4) Wet or Damp Interior Locations: Building wire in raceway.

(5) Exterior Locations: Building wire in raceway.

(6) Underground Locations: Building wire in raceway.

K. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

(1) Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 100 feet; and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet.

L. Neatly train and secure wiring inside boxes, equipment and panelboards.

M. Use UL listed wire-pulling lubricant for pulling conductors in raceways.

N. Protect exposed cables.

O. Support cables above accessible ceilings to keep them from resting on ceiling tiles.

P. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.

Q. Terminate spare conductors with electrical tape.

R. Devices shall mount flush or as indicated on the Drawings.

S. Install wiring devices in accordance with manufacturer's instructions.

(1) Install wall switches 48 inches above floor, "OFF" position down.

(2) Install wall dimmers 48 inches above floor. De-rate ganged dimmers as instructed by manufacturer. Do not use a common neutral, provide a separate neutral for each dimmed circuit.

(3) Install convenience receptacles 18 inches above floor, 4 inches above counters or splashbacks, with grounding pole on bottom. Receptacles above counters or splashbacks shall not be mounted higher than 44" AFF to bottom of device unless noted otherwise.

(4) Install GFCI receptacles at all outdoor locations and all indoor locations as required by NFPA 70, and as indicated.

(5) Install specific purpose receptacles at heights shown on Drawings.

(6) Install cord and attachment plug caps on equipment under the provisions of Section 16100. Size cord for connected load and rating of branch circuit over-current protection.

T. Install wall plates flush and level.

(1) Install decorative plates on switch, receptacle, telephone, television and blank outlets in finished areas.

(2) Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

(3) Install weatherproof coverplates on all devices/boxes in wet or outdoor locations.

3. FIELD QUALITY CONTROL:

A. Perform field inspection and testing of circuits under provisions of Section 16000.

(1) Inspect wire and cables for physical damage and proper connection.

(2) Torque test conductor connections and terminations to manufacturer's recommended values.

(3) Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

4. PAINTING:

A. All equipment furnished shall be rendered free from grease, dirt, etc. and should any equipment with factory finish be scratched, the blemish shall be touched-up with the equipment manufacturer's touch-up paint.

B. All unprotected hangers, supports, etc. shall be painted with rust resistant primer and two finish coats of acrylic enamel.

C. All exposed conduit, boxes, & fittings shall be painted to match background surfaces.

(1) Exterior Paint:

a. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

1. Low-Luster Finish: 2 finish coats over a galvanized metal primer.

(a) Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer.

2. Full-Gloss, Acrylic-Enamel Finish: 2 finish coats over a galvanized metal primer.

(a) Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer.

(b) First and Second Coats: Full-gloss, waterborne, acrylic enamel applied at spreading rate recommended by the manufacturer.

(2) Aluminum: Provide the following finish systems over exterior aluminum surfaces:

a. Full-Gloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

1. Primer: Rust-inhibitive, acrylic- or alkyd-based, metal primer, as recommended by the manufacturer for use over aluminum.

(3) Interior Paint:

a. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

(a) Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer.

(b) First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer.

END OF SECTION 16100

SECTION 16200 - ELECTRIC POWER AND DISTRIBUTION

PART I - GENERAL

1. INCLUDED SECTIONS:

A. Service Entrance and Metering
B. Utility Requirements
C. Panelboards
D. Enclosed Switches
E. Fuses
F. Enclosed Circuit Breakers
G. Contactors
H. Starters
J. Clocks

2. SERVICE TYPE DESCRIPTION: Electric Service System shall be 208Y/120 volts three phase 4 wire served from an underground utility primary service and an underground secondary service derived from a pad mounted transformer.

3. PROJECT CONDITIONS: Verify field measurements for the equipment to ensure proper fit within the space provided.

4. UTILITY REQUIREMENTS:

A. The serving utility is Gulf Power.

B. Metering shall be provided by the contractor.

(1) Coordinate with the utility for exact metering requirements.

(2) Install metering equipment provided by the utility company.

(3) Pay for all assessments, service charges, fees, etc. from the utility for service requirements. These costs from the electrical utility for providing the electric service shall be excluded in the Contractor's bid.

5. EQUIPMENT APPLICATION: All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within those ratings and application shall be subject to any stipulations or exceptions established by the independent agency or laboratory. Use of equipment or materials in applications beyond that certified by the agency or beyond that recommended by the manufacturer shall be cause for removal and replacement of such mis-applied items.

PART II - PRODUCTS

1. PANELBOARDS:

A. DISTRIBUTION PANELBOARDS: NEMA PB 1; circuit breaker type.

(1) Bus Material: Tin-plated Copper or Aluminum.

(2) Ground Bus: Copper.

(3) Enclosures: Type 1 or 3R as shown on the Drawings.

(4) Mounting: Surface or flush mount as indicated on the Drawings.

(5) Door: Hinged with lock. Door assembly shall be hinged to enclosure for panels rated 250 amps or larger.

(6) Circuit Breakers: Bolt-on, ratings as shown on Drawings..

B. ACCESSORIES: Provide panel and branch device accessories as indicated on the Drawings

C. FUTURE PROVISIONS: Where space provisions are indicated on the Drawings, provide bussing, bus extensions, etc. required to mount future circuit breakers. Where spare provisions are indicated on the Drawings, provide circuit breakers complete and ready for connection.

D. MANUFACTURERS: Cutler Hammer, Square-D Company, General Electric, and ITE-Siemens

2. ENCLOSED SWITCHES:

A. ENCLOSED SWITCH ASSEMBLIES: NEMA KS 1, Type HD; Fuse clips shall be designed to accommodate Class ‘J’ or ‘R’ fuses as shown on the Drawings.

B. ENCLOSURES: NEMA KS 1; Type 1 or 3R as required.

C. GROUND: Provide grounding lug.

D. RATINGS: 600 or 250 volts to match system service requirements, poles and amp ratings as indicated on the Drawings and coordinated with other equipment installers.

E. MANUFACTURERS: Cutler Hammer, Square-D Company, General Electric, and ITE Siemens

3. FUSES:

A. Service Entrance/Feeder Circuits – 601 Amp and larger.

(1) U.L. Class L

(2) Current Limiting

(3) 200,000 amp RMS Interrupt Rating

(4) Voltage Rating: As required for system compatibility

B. Service Entrance/Feeder Circuits – 600 Amp and smaller.

(1) U.L. Class RK1

(2) Current Limiting

(3) 200,000 amp RMS Interrupt Rating

(4) Voltage Rating: As required for system compatibility

C. Motor, Motor Controller, Transformer and Inductive Circuits.

(1) U.L. Class RD!, Time Delay

(2) Current Limiting

(3) 200,000 amp RMS Interrupt Rating

(4) Voltage Rating: As required for system compatibility

D. MANUFACTURERS: Cutler Hammer, Square-D Company, General Electric, and ITE-Siemens

4. ENCLOSED CIRCUIT BREAKERS:

A. CIRCUIT BREAKER: NEMA AB 1; Voltage and Accessories as indicated on Drawings.

B. ENCLOSURES: Code gauge steel, NEMA 1 or 3R as required.

C. MANUFACTURERS: Cutler Hammer, Square-D Company, General Electric, and ITE-Siemens

5. CONTACTORS:

A. MECHANICALLY HELD CONTACTORS: NEMA ICS 2; mechanically held, electrically operated.

B. ELECTRICALLY HELD CONTACTORS: NEMA ICS 2; electrically held, electrically operated.

C. COIL OPERATING VOLTAGE: 120 or 277 volts as indicated on drawings, 60 Hz.

D. ENCLOSURES: NEMA ICS 6; Type 1 or 3R as required.

6. STARTERS:

A. Starters furnished with the equipment of other sections shall comply with this section.

B. Single Phase Fractional Horsepower (HP) Manual Starter: 1 or 2 pole, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, integral red pilot light, and toggle operator.

C. For motors of 0 HP thru 15 HP, starters may be across-the-line type.

D. For motors of 20 HP thru 30 HP, starters shall be part-winding, auto-transformer, wye-delta or other current limiting type.

E. For motors of 35 HP and above, starters shall be auto-transformer, wye-delta, or approved solid state soft start.

E. This contractor shall contact the serving electric utililty for written approval on the starter type for every motor 20 HP and above.

7. CLOCKS:

A. Furnish and install, as indicated on the electrical plans, battery operated quartz clocks. Clocks shall have black gothic numerals and red second hand on a 12” dial. Clock shall operate on one or two AA batteries. The clock shall be furnished with lead calcium batteries.

PART III - EXECUTION

1. EXAMINATION AND PREPARATION:

A. Make arrangements with utility company to obtain permanent electrical service to the facility. Provide CT Cabinet and Meter base as required by utility for service connection.

B. Provide concrete pad for utility transformer. Pad details on the Drawings are for estimating purposes. Coordinate exact pad requirements with the utility prior to installation.

B Provide pressure treated service/metering pole of class and size indicated on the Drawings.

2. INSTALLATION:

A. Install utility services in accordance with utility company standards and requirements.

(1) Underground Service: Install service entrance conduits and conductors from the utility service point to the service equipment as shown on the Drawings.

(2) Provide lugs on utility transformer spaces sized to accommodate service entrance conductors.

B. Install equipment in accordance with manufacturer's instructions.

C. Install panelboards to NEMA PB 1.1.

D. Provide labels for all panelboards and distribution equipment.

F. Provide typewritten directory inside panel door for all panelboards.

G. Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Provide nameplate on cover exterior to indicate motor served.

END OF SECTION 16200

SECTION 16289 – TRANSIENT VOLTAGE SURGE SUPPRESSION SYSTEM

PART I - GENERAL

1.01 RELATED SECTIONS

A. The Contractor shall furnish and install the Transient Voltage Surge Suppression (TVSS) equipment having the electrical characteristics, ratings and modifications as specified herein and as shown on the contract drawings. Refer to related sections for surge requirements in:

1.02 RELATED SECTIONS

a) Section 16200 -- Electric Power And Distribution

1.03 REFERENCES.

The TVSS units and all components shall be designed, manufactured and tested in accordance with the latest applicable UL Listed standards (UL 1449, 2nd Edition), UL 1283 and CSA certified per CSA 22.2

1.04 SUBMITTALS

A. The following information shall be submitted to the Engineer:

1. Provide verification that the TVSS device complies with the required UL 1449 2nd Edition and CSA approvals.

2. Provide actual let through voltage test data in the form of oscillograph results for the ANSI/IEEE C62.41 Category C3 & C1 (combination wave) and B3 (ringwave) tested in accordance with ANSI/IEEE C62.45.

3. Provide spectrum analysis of each unit based on MIL-STD-220A test procedures between 50 kHz and 200 kHz verifying the device's noise attenuation exceeds 41 dB at 100 kHz.

4. Provide test report from a recognized independent testing laboratory verifying the suppressor components can survive published surge current rating on both a per mode and per phase basis using the IEEE C62.41, 8 x 20 microsecond current wave. Note that test data on individual module is not accepted.

B. Submit five (5) copies of the above information.

1.05 SUBMITTALS – FOR INFORMATION:

When requested by the Engineer the following product information shall be submitted to the engineer:

a) UL 1449 Listing classifications, and clamping voltage rating for each mode of protection.
b) ANSI/IEEE C62.41 AND C62.45 Category C3 clamping voltage.

c) Sequential surge survivability per ANSI/IEEE C62.45.
d) Dimensions and weight
e) Recommended connection wiring diagram

1.06 QUALIFICATIONS

A. Manufacturer must have a minimum of five years (in U.S.) experience in producing TVSS systems.

B. TVSS devices and accessories shall be obtained through one manufacturer.

C. Other manufacturers not listed in this document may be considered by the engineer/architect at least 14 days prior to bid. The specifications of the product listed in 1.05 "SUBMITTALS-FOR INFORMATION" shall be highlighted.

1.07 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these Shall be included with the equipment at time of shipment.

1.08 OPERATION AND MAINTENANCE MANUALS

A. Five (5) copies of the equipment operation and maintenance manuals shall be provided.

B. Operation and maintenance manuals shall include the following information:

1. Instruction books and/or leaflets
2. Recommended renewal parts list

1.09 EXTRA MATERIALS:

A. Furnish replaceable protection modules for service entrance unit with labeled protective covering for storage.

PART II - PRODUCTS

2.01 MANUFACTURERS

A. Cutler-Hammer, Square D, Advanced Protection Technologies (APT), Surge Suppression Inc.

2.02 VOLTAGE SURGE SUPPRESSION – GENERAL

A. Electrical Requirements

1. Unit Operating Voltage -- Refer to drawings for operating voltage and unit configuration.

2. Maximum Continuous Operating Voltage (MCOV) -- The MCOV shall be greater than 115% of the nominal system operating voltage.

3. Protection Modes -- For a wye configured system, the device must have directly connected suppression elements between line-neutral (L-N), line-ground (L-G), and neutral-ground (N-G). For a delta configured system, the device must have suppression elements between line to line (L-L) and line to ground (L-G).

4. UL 1449 2nd Edition SVR -- The maximum UL 1449 2nd Edition SVR for the device must not exceed the following:

Modes	208Y/120	480Y/277
L-N; L-G; N-G	500 V	900 V
L-L	900 V	1500 V

5. ANSI/IEEE Cat C3 Let Through Voltage -- The let through voltage based on IEEE C62.41 and C62.45 recommended procedures for Category C3 surges (20 kV, 10 kA) shall be less than:

Modes	208Y/120	480Y/277
L-N	910 V	1070 V

6. ANSI/IEEE Cat. B3 Let Through Voltage -- Let through voltage based on IEEE C62.41 and C62.45 recommended procedures for the ANSI/IEEE Cat. B3 ringwave (6 kV, 5000 amps) shall be less than:

Modes	208Y/120	480Y/277
L-N	375 V	510 V

B. TVSS Design

1. Balanced Suppression Platform -- The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating TVSS modules shall not be acceptable.

2. Electrical Noise Filter -- Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be 41 dB at 100 kHz using the MIL-STD-220A insertion loss test method. The unit shall be complimentary

listed to UL 1283. Products not able to demonstrate noise attenuation of 41 dB @ 100 kHz shall be rejected.

3. Internal Connections -- No plug-in component modules shall be used as surge current conductors. All internal components shall be hardwired with connections utilizing low impedance conductors and compression fittings.

4. Safety and Diagnostic Monitoring -- Each unit shall be equipped with 200 kAIC internal fuses. Each unit shall provide the following three levels of monitoring:

   a) Continuous monitoring of fusing system
   b) Thermal detection circuit shall monitor for overheating in all modes due to thermal runaway.

   c) A green/red solid state indicator light shall be provided on each phase. The absence of a green light and the presence of a red light, shall indicate which phase(s) have been damaged. Fault detection will activate a flashing trouble light. Units which can not detect open-circuit damage, thermal conditions and over current will not be accepted.

5. Warranty -- The manufacturer shall provide a full ten (10) year warranty from the date of shipment against any TVSS part failure when installed in compliance with manufacturer's written instructions and any applicable national or local electric code.

2.03 SYSTEM APPLICATION

A. The TVSS applications covered under this section include distribution and branch panel locations, bus plugs, motor control centers (MCC), switchgear, and switchboard assemblies.

B. Surge Current Capacity -- The minimum total surge current 8 x 20 microsecond waveform that the device is capable of withstanding shall be as shown in the following table:

Application	Min. Surge Current (per mode)
Service Entrance (Switchboards Switchgear, MCC Main Entrance)	120 kA
Distribution Panelboards	80 kA
High Exposure Roof Top Locations	80 kA
Branch Locations (Panelboards, MCC's, Busway)	40 kA

2.04 ACCESSORIES

A. Push to test feature to verify operational integrity.

B. Form C dry contacts one NO, one NC for remote status monitoring.

2.05 ENCLOSURES

A. All enclosed equipment shall have NEMA 1 general purpose enclosures, unless otherwise noted. Provide enclosures suitable for locations as indicated on the drawings and as described below:

1. NEMA 1 surface or flush-mounted general purpose enclosures primarily intended for indoor use
2. NEMA 12 dust-tight enclosures intended for indoor use primarily to provide protection against circulating dust, falling dirt and dripping non-corrosive liquids (Panelboards Only)
3. NEMA 3R rainproof enclosures intended for outdoor use primarily to provide protection against rain, sleet and damage from external ice formation
4. NEMA 4 watertight stainless steel intended for indoor or outdoor use primarily to provide protection against windblown dust and rain, splashing rain, hose-directed water, and damage from external ice formation. (Side Mounted Units Only)

PART III - EXECUTION

3.01 EXAMINATION

3.02 FACTORY TESTING

A. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.

3.03 INSTALLATION

A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.

B. Surge protection devices shall be installed and connected before the service entrance is connected or energized.

C. Existing utilities shall not be interrupted without written permission from project’s architect.

END OF SECTION 16289

DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER
OKALOOSA COUNTY SCHOOL DISTRICT
OKALOOSA COUNTY, FLORIDA

SECTION 16500 - LIGHTING

PART I - GENERAL

1. RELATED DOCUMENTS:

A. Section 16000 – Electrical General Requirements, apply to the work specified in this Section, with additions and modifications specified herein.

2. INCLUDED SECTIONS:

A. Luminaires
B. Exit Signs

3. LIGHTING MANUFACTURERS: The drawings indicate the lighting fixture descriptions and catalog numbers. Equal manufacturers are also given. Manufacturers not listed as equals shall be submitted to the engineer at least 10 days prior to bid.

PART II - PRODUCTS

1. LUMINAIRES:

A. LUMINAIRE SCHEDULE:

(1) Product requirements for each luminaire are specified in luminaire schedule on Drawings.

B. ACCESSORIES: Provide required accessories for mounting and operation of each luminaire as indicated.

(1) Recessed Luminaires: Provide trim type suitable for ceiling system in which luminaire is installed.

(2) Thermal Protection: Provide thermal protection devices to meet NFPA 70 requirements.

(3) Surface Luminaires: Provide spacers and brackets required for mounting.

(4) Pendant Luminaires: Provide swivel hangers, pendant rods, tubes, and chains as indicated to install luminaire at appropriate height.

(5) Emergency Drivers: Provide emergency drivers for emergency fixtures as designated on drawings.

C. LAY-IN TROFFERS:

(1) Door Frame: Aluminum .050”, extruded with mitered corners. Latches to be fully enclosed, spring loaded, cam type. Door frame shall be fully gasketed.

(2) Housing: Cold rolled steel, (20) (22) gauge minimum with smooth effect mitered corners.

(3) Finish: Painted after fabrication with 90% reflective glossy white thermosetting powder coat.

2. EXIT SIGNS:

A. DESCRIPTION: Exit sign fixture.

(1) Lamps: Manufacturer's standard.

(2) Voltage: 120/277 volt as scheduled.

B. CONSTRUCTION:

(1) Face: Stencil face with red letters.

(2) Directional Arrows: Universal for field adjustment.

(3) Mounting: Universal for field selection.

(4) Exterior: Shall have a mechanical (bolts or screws) connection between the fixture housing and the canopy/base.

C. EMERGENCY POWER SUPPLY: Integral, listed for emergency lighting use.

(1) Battery: Lead calcium type.

(2) Battery Charger: Dual-rate type.

(3) Indicators and Controls: AC ON; test switch.

III. EXECUTION

1. EXAMINATION AND PREPARATION: Examine adjacent surfaces to determine that surfaces are ready to receive work.

2. INSTALLATION:

A. Install luminaires and accessories in accordance with manufacturer's instructions.

(1) Provide pendant accessory to mount suspended luminaires at height indicated. Use swivel hangers on sloped ceilings.

(2) Support surface mounted luminaires from ceiling structure; provide auxiliary support across ceiling structure support. Fasten to prohibit movement.

(3) Install recessed luminaires to permit removal from below. Install luminaires so that there is no light leakage around fixture trim. Provide four (4) cable supports and four (4) t-clips for each lay-in fixture and install in accordance with Article 410-16 C of the National Electrical Code.

(4) Install lamps in luminaires and lampholders.

3. ADJUSTING AND CLEANING:

A. Align luminaires and clean lenses and diffusers at completion of work.

B. Aim adjustable luminaires and lampholders as indicated or as directed.

C. Adjust directional arrows on exit signs to meet approval of authority having jurisdiction.

D. Clean paint splatters, dirt and debris from installed luminaires.

E. Replace luminaires which have failed lamps at completion of work.

END OF SECTION 16500

SECTION 16800 – INTERIOR LIGHTING CONTROLS

I. GENERAL

1. INTRODUCTION

The work covered in this section is subject to the requirements in the General Conditions of the Specifications. Contractor shall coordinate the work in this section with the trades covered in other sections of the specification to provide a complete and operable system.

2. SYSTEM DESCRIPTION

Extent of lighting control system work is indicated by drawings and by the requirements of this section. It is the intent of this section to provide an integrated, energy saving lighting control system including Lighting Control Panels, Occupancy Sensors, and Daylighting Controls from a single supplier. Contractor is responsible for confirming that the panels and sensors interoperate as a single system.

3. QUALITY ASSURANCE

Manufacturers: Firms regularly engaged in the manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years. To ensure equipment compatibility, project coordination, and system warranty all products shall be the responsibility of a single manufacturer.

Comply with NEC, NEMA, and FCC Emission requirements for Class A applications.

UL Approvals: Relay panels and accessory devices are to be UL listed under UL 916 Energy Management Equipment. Configured to order or custom relay panels shall be UL Listed under UL 508, Industrial Control Panels.

This specification is based on Wattstopper Lighting Integrator series. All manufacturer's considered equal shall be submitted to the architect/engineer for approval. All submittals that are not of a single manufacturer shall be rejected.

4. SUBMITTALS

Submit manufacturer's data on lighting control system and components including shop drawings, detailed point to point wiring diagrams, and floor plans showing occupancy and daylighting sensor locations. Provide typical mounting details for occupancy and daylighting sensors for this application.

5. MANUFACTURERS

This specification is based on products from Watt Stopper/Legrand, Santa Clara, CA. Any other system wishing to be considered must submit descriptive information 10 days prior to bid. Prior approval does not guarantee final approval by the electrical engineer. The contractor shall be completely responsible for providing a system meeting this specification in its entirety. All deviations from this specification must be listed and individually signed off by the consultant.

II. PRODUCTS

2.02 RELAY PANELS

1. System Description

Lighting Control Panels shall be UL listed and consist of the following:

a) Enclosure/Tub: NEMA 1, NEMA 3R, or NEMA 4 as indicated on the drawings, sized to accept an interior with 1-8 relays, 1-24 relays and six (6) four pole contactors, or 1-48 relays with six (6) four pole contactors.

b) Cover: Surface or Flush as required, hinged, and lockable and with restricted access to line voltage section.

c) Interior: Barrier included for separation of high voltage (class 1) and low voltage (class 2) wiring. The interior shall include intelligence boards, power supply, mechanically latched control relays and multi-pole contactors. The interiors will include the following features:

i) Screwless, removable, plug-in connections for all low voltage terminations.

ii) Each relay shall be capable of individual ON/OFF control by a low voltage switch and/or occupancy sensor input.

iii) The system shall monitor true relay status; the relay status will be displayed at the onboard pilot LED and monitored by the system electronics.

iv) Stagger the ON and OFF sequence of the relays.

v) Heavy Duty Relays – Mechanically latching contacts with single moving part design for improved reliability. Relays to have the following characteristics:

(1) 30 amp NEMA 410 electronic ballast rated and 20 amp tungsten, rated for 50,000 ON/OFF cycles at full load, Support #12 - #14 AWG solid or stranded wire and rated for 120, and 277 volts; 20 amp NEMA 410 electronic ballast rated and 20 amp tungsten 347 volts.

(2) 30 VAC isolated contacts for status feedback and pilot light indication.

(3) 14,000 amp short circuit current rating.

vi) Contactors shall be DIN rail mounted, four pole standard, normally open or normally closed, electrically held with 120 or 277 volt coil voltage to match panel control power voltage. Contactors shall be compatible with all lighting, ballast and HID loads and be rated for 277 volt 20 amp tungsten and 600 volt 30 amp ballast loads.

d) Power Supply: Multi-voltage transformer assembly with enough power to supply all electronics, occupancy sensors, dataline switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.

2.03 GROUP, CHANNEL AND PATTERN CONTROL

1. Provide an optional Group Switching card (GS) that allows simple group and pattern configuration at the panel without requiring handheld devices or special programming tools. The GS shall allow any group of relays within the panel to be associated (smartwired) to a channel button using the following procedure:

a) **Press and hold the group pushbutton for several seconds**. The group LED and the LEDs for relays currently controlled by that input will begin to flash.

b) **Select the relays to be controlled.** The LED for each relay smartwired to the channel selected will be flashing ON/OFF. Press the associated relay control button to add/delete that relay to/from the group.
c) **Press the group pushbutton again**. The LEDs will stop flashing and the group pushbutton and associated switch inputs will now control the relays selected.

2) Group Status: Each group pushbutton shall include an LED status indication. The LED will be ON whenever all of the relays within the group are ON; and shall go OFF when all of the relays within the group go OFF. The LED will be green when in a "mixed" state. Each channel shall also have an associated dry contact closure and pilot contact which tracks the LED operation described above.

3) Hardware Features
a) Each GS card will support up to eight groups (channels). The 8-relay and 24-relay panels shall support one GS card; the 48 relay panels will support two cards.
b) Individual relays may be assigned to more than one channel, and the channel status will be annunciated appropriately.
c) Each channel shall also have an input for connecting switch or dry contacts for controlling a channel. Inputs shall accept 2 or 3-wire, maintained or momentary inputs, or a 24 VDC signal from occupancy sensor or other voltage signaling device. Groups may be controlled by: an on-board group pushbutton switch, low voltage switch, dataline switch, occupancy sensor, photocell, or time of day.
d) Screwless, removable, plug-in terminals will be provided for all low voltage wiring connections.

2.04 AUTOMATION PANEL NETWORKING AND DATALINE SWITCH SUPPORT

1. An automation control card provides an Echelon® based network for communications between the intelligent field devices, panels and optional Echelon based Clock, BMS Module, Universal Switch Module and Photocontrol Module.
2. The modules in multiple panels shall be linked over a single dataline that uses the open digital Echelon/LonTalk® protocol for communications.
3. The dataline shall extend from the lighting control panel and provide a single communications bus to allow dataline switches and other intelligent field devices to communicate with the panels.
4. Dataline communications wire shall be 18 AWG, 4 unshielded copper conductors (two independent twisted pairs) meeting Class 2P NEC code requirements. The dataline can be run in a loop, serial, or star configuration.

2.05 NETWORK CLOCK

1. Provide an eight channel network clock that connects to the system using the four conductor data communications wire network described in Section 2.10.
2. The clock will be used to schedule any of the eight global channel groups (Section 2.03) in the relay panel network. The clock will support all of the energy saving features required of ASHRAE 90.1 - 2001, IECC 2003, as well as all state and local energy codes.
3. The clock will provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and EEPROM for program retention. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.
4. The clock shall allow unique scenario and time delays. Scenarios are:
a) Scheduled ON / OFF

b) Manual ON / Scheduled OFF
c) Manual ON / Auto Sweep OFF (for AS-100 Switches)
d) Astro ON / OFF (or Photo ON / OFF)
e) Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)

5. The clock shall include system diagnostic functions to identify devices anywhere on the network dataline, and will function as a dataline switch programming tool.

6. Features
   a) Clear 8-line, 22-character per line display and a simple user interface and online help.
   b) Retains memory and time for a minimum of 10 years.

2.06 LOW VOLTAGE SWITCHES / PLATES

1. Description
   a) Low voltage switches shall provide a momentary signal to allow individual relay control or group control using the Group Switching card specified in Section 2.03 above. Switches shall be available in 1-button, 3-button, 5-button, or 9-button designs. The 1, 3, and 5 switch devices shall mount in a standard single gang box: the 9-switch version in a two-gang box.

2. Features
   a) Switches shall be constructed of non-breakable Lexan on all exposed parts and shall include a matching screwless Lexan wall plate.
   b) Individual buttons shall have a removable clear cover to allow standard 9 mm (3/8 inch) labeling tape to be used to identify the controlled loads
   c) Each switch shall use an LED pilot light for the individual buttons to indicate status of the controlled relay or group of relays.

2.07 DATALINE SWITCHES

1. Description
   a) Intelligent digital switching shall be provided operating on the dual twisted pair communication wire. Switches shall be available in single, dual, quad, or octal (1-button, 2-button, 4-button, or 8-button) designs. The single, dual, and quad devices shall mount in a standard single-gang box, the octal version in a two-gang box.
   b) Each button in a switch can be individually programmed. Programming is done by smartwiring rather than with a handheld keypad or computer. Each button can control any one of the following options:
      i) Any individual relay in any single panel.
      ii) Any group of relays in any single panel.
      iii) Any group of relays in the system (via network clock or WinControl software package).
   c) For applications that require pattern switching, any button can perform its function using an ON/OFF/Not Controlled pattern of relays instead of the normal All ON/OFF.

2. Features
   a) Switches shall be constructed of non-breakable Lexan on all exposed parts and shall include a matching screwless Lexan wall plate.

b) Individual buttons shall have a removable clear cover to allow standard 9 mm (3/8 inch) labeling tape to be used to identify the controlled loads.

c) Each switch shall use a bi-color LED pilot light for the individual buttons to indicate status of the controlled relay or group of relays. LED indications are Red for All ON, Green for Mixed State (some relays in the group ON and others OFF), and No LED for All OFF.

d) Switch LED pilot lights shall flash green to indicate impending off sweep during the five-minute grace period following blink warning of the lights. Once the button is pressed, the LED will change to Red to acknowledge the occupant's override command to keep lights ON.

e) Multiple dataline switches smartwired to control the same relay or relay group shall indicate the same status automatically.

f) Each switch shall also include a locator light illuminating the switch for easy location in the dark.

g) The dual, quad, and octal switches shall all include a single master button that will override all relays controlled by the individual buttons OFF, or Restore them to their original state. Each switch's master button configuration can be altered to perform a Master ON/OFF, OFF Only, or Disabled function if desired.

h) Switches can be configured to follow a "Cleaning" scenario. This specific scenario shall prevent the cleaners from overriding OFF any relays turned ON by the occupant.

i) Each switch is available in a Key lock Override version. Once a key is inserted, the individual buttons will function for five minutes.

2.08 DATALINE

The Dataline wire will be supplied by the equipment manufacturer and will include the manufacturers name, catalog number and length of wire printed on the wire jacket. The contractor, at their own expense will, replace an improper dataline wire.

2.09 EXTERIOR PHOTOCELLS

1. Each photocell shall be mounted in the appropriate location for measuring the available daylight. Each photocell will have a separate control/calibration module mounted separately and in an accessible location.
2. The control module shall:
   a) Have a separate trip point settings. These settings will be entered via easily readable dial switches.
   b) Have a fixed deadband of 10%.
   c) Have a starting delay.
   d) Be suitable for panel mounting.
   e) Be UL listed.

III. EXECUTION

3.01 SUPPORT SERVICES

1. Service Description
2. System Startup
    a) Manufacturer shall provide a factory authorized technician to confirm proper installation and operation of all system components. The startup requirement is intended to verify:
        i) That all occupancy and daylighting sensors are located, installed, and adjusted as intended by the factory and the contract documents.
        ii) The occupancy sensors and daylighting sensors are operating within the manufacturers specifications.
        iii) The sensors and relay panels interact as a complete and operational system to meet the design intent.
    b) Manufacturer to provide a written statement verifying that the system meets the above requirements.
3. Training
    a) Manufacturer shall provide factory authorized technician to train owner personnel in the operation, programming and maintenance of the lighting control system including all occupancy sensors and daylighting controls.
4. Documentation
    a) Manufacturer shall provide system documentation including:
        i) Reflected ceiling plans showing each occupancy and daylighting sensor location.
        ii) System one-line showing all panels, number and type of switches and sensors, dataline, telephone override modules, and central PC.
        iii) Drawings for each panel showing hardware configuration and numbering.
        iv) Panel wiring schedules.
        v) Typical wiring diagrams for each component.
    b) The manufacturer will certify that the products will meet the product specifications and local energy codes. If any additional equipment is required to meet the coverage patterns or local energy codes, the manufacturer will provide the additional equipment at no cost to the owner.

5. Programming
    a) Manufacturer shall provide system programming including:
        i) Wiring documentation.
        ii) Switch operation.
        iii) Telephone overrides.
        iv) Operating schedules.
    b) These shall be provided on floppy disk compatible with the central PC's Lighting Control Program.
6. Extended Warranty

a) Manufacturer shall provide a 4 year extended warranty in addition to a required one year warranty for all system components.

END OF SECTION 16800

SECTION 17000 - COMMUNICATIONS HORIZONTAL CABLING

PART 1 – GENERAL

1.1. SUMMARY

1.1.1. The following specification is intended to provide a set of instructions and materials needed to furnish and install Telecommunications Cabling, within parameters set by industry standards, in a new facility.

1.1.2. In order to provide a high quality, standards-based communications infrastructure within any new facility, the design and engineering of the communications infrastructure within such projects shall be engineering by qualified staff and must be reviewed and approved by a representative of Okaloosa County Schools.

1.1.3. Further, engineering designs shall meet all Federal, State, applicable local codes and standards, and the requirements outlined in this document. Any discrepancies between the requirements and codes must be brought to the attention of Okaloosa County Schools or their agent prior to any work being started.

1.1.4. This Section includes the following items, for wiring systems used as signal pathways for voice and high-speed data transmission:

1.1.4.1. Unshielded twisted-pair cabling systems

1.1.4.2. Fiber-optic cabling systems

1.1.4.3. Workstation outlets

1.1.4.4. Equipment racks & wire management

1.1.5. Related Sections:

1.1.5.1. Section 16000

1.1.5.2. Section 17001

1.1.5.3. Section 17002

1.2. CONSTRUCTION CODES

1.2.1. All materials and methods of installation shall comply with the applicable sections of the following codes:

1.2.1.1. Uniform Building Code (UBC)

1.2.1.2. National Electrical Code (NEC/NFPA 70)

1.2.1.3. National Electrical Safety Code (NESC IEEE C 2)

1.2.1.4. American Disabilities Act (ADA)

1.2.1.5. Local AHJ (Authority Having Jurisdiction) Codes, amendments, and ordinances.

1.2.2. Telecommunications Industry Standards: All materials and installation practices shall comply with the applicable sections of the following Standards:

1.2.2.1. ANSI/TIA/EIA-568-B - Commercial Building Telecommunications Cabling Standard, Latest revision & all amendments

1.2.2.2. ANSI/TIA/EIA-569-B - Commercial Building Standards for Telecommunications Pathways and Spaces, Latest revision & all amendments

1.2.2.3. ANSI/EIA/TIA-570-B - Residential and Light Commercial Telecommunications Wiring Standard, Latest revision & all amendments

1.2.2.4. ANSI/TIA/EIA-606 - The Administration Standard for the Telecommunications Infrastructure of Commercial Building, Latest revision & all amendments

1.2.2.5. ANSI/J-STD-607 - Commercial Building Grounding and Bonding Requirements for Telecommunications, Latest revision & all amendments

1.2.2.6. ANSI/EIA-310-D - Cabinets, Racks, Panels and Associated Equipment, 1992

1.2.2.7. TSB-162 - Telecommunications Cabling Guidelines for Wireless Access Points Latest revision & all amendments

1.2.2.8. ANSI/TIA/EIA-942 - Telecommunications Infrastructure Standards for Data Centers, Latest revision & all amendments

1.2.2.9. ANSI/TIA/EIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant

1.2.2.10. ANSI/TIA/EIA-526-14A - Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant

1.2.2.11. IEEE 802.3af - Data Terminal Equipment (DTE) Power Over Media Dependent Interface (MDI), 2003 (Superceded by IEEE 802.3-2005)

1.2.2.12. IEEE 802.3 - Information Technology – Telecommunications and Information Exchange between Systems – Local and Metropolitan Area Networks – Specific Requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, 2005.

1.2.2.13. ANSI/NECA/BICSI-568-2001 - Standard for Installing Commercial Building Telecommunications Cabling

1.2.2.14. BICSI TDMM - Telecommunications Distribution Methods Manual. Latest Edition

1.2.2.15. IEC/TR3 61000-5-2 - Ed. 1.0 and amendments - Electromagnetic compatibility (EMC) - Part 5: Installation and mitigation guidelines - Section 2: Earthing and cabling

1.2.2.16. ISO/IEC 11801 - Information Technology – Generic Cabling for Customer Premises, 2002.

1.2.2.17. ISO/IEC 18010 - Information Technology – Pathways and Spaces for Customer Premises Cabling, 2005.

1.2.2.18. ISO/IEC 14763-1 - Information Technology – Implementation and Operation of Customer Premises Cabling – Part 1: Administration, 2004.

1.2.2.19. BS EN 50173-1 - Information Technology – Generic Cabling Systems – Part 1: General Requirements, 2002

1.2.2.20. BS EN 50174-1 - Information Technology – Cabling Installation – Part 1: Specification and Quality Assurance, 2001

1.2.2.21. UL723 - Test for Surface Burning Characteristics of Building Materials

1.2.3. DOCUMENT AVAILABILITY

1.2.3.1. Installers shall have read the above documents and shall be familiar with the requirements that pertain to this installation. The documents may be obtained from:

1.2.3.1.1. Global Engineering Documents, 15 Inverness Way East, Englewood, CO, 80112-5776 Phone: 800-854-7179, Fax: 303-397-2740, http://global.his.com/

1.2.3.1.2. IEEE- Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY, 10017-2394, Phone: 800-678-IEEE, Fax: 732-981-9667, http://standards.ieee.org/

1.2.3.1.3. BICSI, 8610 Hidden River Pkwy., Tampa, FL 33637-1000, Phone: 800-242-7405, Fax: 813-971-4311, http://www.bicsi.org

1.2.4. DEFINITIONS AND ABBREVIATIONS

1.2.4.1. AHJ – Authority having jurisdiction

1.2.4.2. AWG - American Wire Gauge

1.2.4.3. BICSI - Building Industry Consulting Services International

1.2.4.4. ER - Equipment Room - (see MDF)

1.2.4.5. FO - Fiber Optic

1.2.4.6. Gbps - Gigabits Per Second

1.2.4.7. IC – Intermediate Cross-Connect – (see IDF)

1.2.4.8. IDF - Intermediate Distribution Frame

1.2.4.9. Mbps - Megabits Per Second

1.2.4.10. MC - Main Cross-Connect – (see MDF)

1.2.4.11. MDF - Main Distribution Frame

1.2.4.12. OFNP - Optical Fiber Non-Conductive Plenum Cable

1.2.4.13. OFNR - Optical Fiber Non-Conductive Riser Cable

1.2.4.14. OSP - Outside Plant

1.2.4.15. PoE – Power over Ethernet

1.2.4.16. PVC - Polyvinyl Chloride

1.2.4.17. RCDD - Registered Communication Distribution Designer

1.2.4.18. SCS - Structured Cabling System

1.2.4.19. STP - Shielded Twisted Pair

1.2.4.20. TC - Telephone Closet – (see IDF)

1.2.4.21. UL® - Underwriter's Laboratories

1.2.4.22. UTP - Unshielded Twisted Pair

1.2.5. LOCAL AHJ

1.2.5.1. This document does not replace any Code, local or otherwise. All contractors must be aware of local requirements and Codes that may affect this project. The AHJ (authority having jurisdiction) will make all final decisions about all requirements. Any discrepancies must be reported to Okaloosa County Schools agent within 24 hours. Any code violations are the responsibility of the contractor, the contractor shall promptly make all required corrections without cost to the Owner.

1.2.6. APPROVED CONTRACTOR

1.2.6.1. The Contractor must be certified by Hubbell Premise Wiring, adhere to the engineering, installation, and testing procedures, and use authorized manufacturer components and distribution channels in provisioning this Project.

1.2.6.2. The Contractor must be certified to install a Fire-Stop system.

1.2.6.3. The system installer shall have an RCDD on staff to assist with project design. RCDD credentials will be submitted with the quote.

1.2.6.4. All members of the installation team must be certified by the manufacturer as having completed the necessary training to complete their part of the installation. All personnel shall be adequately trained in the use of such tools and equipment as required.

1.2.6.5. The Contractor shall own and maintain tools, installation equipment, and test equipment necessary for successful installation and testing of optical and Category 6 premise distribution systems.

1.2.6.6. The Owner reserves the right to require the Contractor to remove from the project any such employee the Owner deems to be incompetent, careless or insubordinate.

1.2.6.7. All clean up activity related to work performed will be the responsibility of the Low Voltage Contractor and must be completed daily before leaving the site.

1.2.6.8. Contractor shall have a permanent location within 100 miles from the job site that will be performing all the warranty work.

1.3. SUBMITTALS:

1.3.1. The contractor will submit three (3) references from companies that had more than 100 drops installed.

1.3.2. The contractor will submit certificates for each person that is installing at the facility from the warranty company showing that they have completed, and passed a course instructing them on the requirements for a successful installation.

1.3.3. The contractor will submit a certificate from the fire stopping manufacturer that they have been trained on the methods utilized in the installation.

1.3.4. The Contractor shall submit shop drawings for approval prior to the start of work. The Contractor shall not start work until shop drawings have been approved in writing. Shop drawings shall include the following:

1.3.4.1. Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.

1.3.4.2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.

1.3.4.3. Cabling administration drawings and printouts.

1.3.4.4. Wiring diagrams to show typical wiring schematics, including the following:

1.3.4.4.1. Cross-connects.

1.3.4.4.2. Patch panels.

1.3.4.4.3. Patch cords.

1.3.4.5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

1.3.4.6. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:

1.3.4.6.1. Vertical and horizontal offsets and transitions.

1.3.4.6.2. Clearances for access above and to side of cable trays.

1.3.4.6.3. Vertical elevation of cable trays above the floor or bottom of ceiling structure.

1.3.4.6.4. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

1.3.5. Submit complete product data for each component, describing physical characteristics and method of installation. Product data sheet is to be clearly highlighted (include part numbers and/or options) on what is being submitted for approval. Product data shall be submitted for, but is not limited to:

1.3.5.1. Workstation outlets, jack and jack assemblies for copper, coax and fiber.

1.3.5.2. Copper, coax and fiber cable.

1.3.5.3. Copper and fiber patch cords.

1.3.5.4. Copper patch panels.

1.3.5.5. Fiber termination boxes.

1.3.5.6. Fire stop products

1.3.5.7. Cabinets and relay racks.

1.3.5.8. Ladder rack and/or cable tray

1.3.5.9. Vertical and horizontal cable management.

1.3.5.10. Labeling and identification products.

1.3.5.11. The contractor will submit a proposed labeling scheme.

1.3.6. Submit documentation regarding the manufacturer's extended warranty. The length of the extended warranty shall be a minimum of twenty-five (25) years. The documentation shall include a sample of the warranty that shall be provided to the Owner when the installation is complete, as well as procedures for handling warranty issues.

1.3.7. Field quality-control test reports.

1.4. PRE-INSTALLATION CONFERENCE:

1.4.1. The contractor shall schedule a conference a minimum of five business days prior to beginning work of this Section.

1.4.2. Clarify questions related to work to be performed, scheduling, coordination, etc.

1.4.3. Attendance: Low Voltage Contractor, General Contractor, Architect, Owner’s representatives, and other parties affected by work of this Section.

1.5. QUALITY ASSURANCE:

1.5.1. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner/Architect/Engineer/Consultant. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed.

1.5.2. All material shall be new, no used or reconditioned material will be accepted.

1.5.3. Ongoing inspections shall be performed during installation by the project manager of the cabling system manager. All work shall be performed in a high-quality manner, and the overall appearance shall be clean, neat, and orderly.

1.5.4. Applicable products shall be ETL and/or UL verified for performance and bear proof as such.

1.5.5. All manufacturers' facilities shall be ISO 9000 or 9001 compliant.

1.5.6. Manufacturers must have field representatives who are industry qualified to provide quality control inspections during the life of the project.

1.5.7. Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

1.6. COORDINATION:

1.6.1. Coordinate layout and installation of voice and data communication cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.6.2. Coordinate service entrance arrangement with local exchange carrier.

1.6.3. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.

1.6.4. Record agreements reached in meetings and distribute to other participants.

1.6.5. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

1.7. WARRANTY:

1.7.1. The length of the extended warranty shall be a minimum of twenty-five (25) years.

1.7.2. A warranty covering all components, equipment and workmanship shall be submitted in writing with system documentation.

1.7.3. The warranty period shall begin on the system's first use by the owner.

1.7.4. Should the cabling system fail to perform its expected operation within this warranty period due to inferior or faulty material and/or workmanship, the contractor shall promptly make all required corrections without cost to the Owner.

1.8. DELIVERY AND STORAGE:

1.8.1. Materials and equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants.

1.8.2. Contractor is responsible for damage and/or loss from theft of all materials and equipment prior to installation.

1.8.3. Test cables upon receipt at Project site:

1.8.3.1. Test optical fiber cables to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set.

1.8.3.2. Test optical fiber cables while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; including the loss value of each. Retain test data and include the record in maintenance data.

1.8.3.3. Test each pair of UTP cable for open and short circuits.

2. PRODUCTS:

2.1. MANUFACTURERS:

2.1.1. In Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.1.1.1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work are limited to manufacturer(s) specified.

2.2. SYSTEM REQUIREMENTS:

2.2.1. Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.

2.2.2. Expansion Capability: Unless otherwise indicated, provide spare fibers and conductor pairs in cables, positions in cross-connect and patch panels, and terminal strips to accommodate 10 percent future increase in the number of workstations shown on Drawings.

2.3. CABLING:

2.3.1. CATEGORY 6 - HORIZONTAL COPPER CABLE:

2.3.1.1. Transmission Requirements: Exceeds ANSI/TIA-568-C.2 for Category 6 and shall be tested to 650 MHz.

2.3.1.2. Applications:

2.3.1.2.1. IEEE 802.3 10BASE-T (ETERNET),

2.3.1.2.2. 100BASE-T (FAT ETHERNET)

2.3.1.2.3. 1000 BASE-T (GIGABIT ETHERNET)

2.3.1.2.4. IEEE 802.3af POE

2.3.1.2.5. IEEE 802.3at-2009 POE+

2.3.1.2.6. ANSI.X3.263 FDDI TP-PMD

2.3.1.2.7. IEEE 802.5 4 & 16 mbps token ring

2.3.1.2.8. 550 MHz Broadband Video

2.3.1.2.9. ATM up to 2.4 Gbps

2.3.1.3. Conductors: 23 AWG, Solid bare copper Dual insulated, FEP (Each pair)

2.3.1.4. Pair Assembly: 2 Primaries twisted in varied lays

2.3.1.5. Color Code:

2.3.1.5.1. Pair 1: White/Blue; Blue

2.3.1.5.2. Pair 2: White/Orange; Orange

2.3.1.5.3. Pair 3: White/Green; Green

2.3.1.5.4. Pair 4: White/Brown; Brown

2.3.1.6. Cable Assembly: 4 pairs cabled together with a flexweb core separator and tightly twisted..

2.3.1.7. Jacket: No lead plenum rated thermoplastic

2.3.1.8. Cable Diameter: .238”

2.3.1.9. Bend Radius: 1” minimum (4x Cable OD)

2.3.1.10. Pulling Tension: 25 lbf (Max)

2.3.1.11. Internal Rip Cord: Yes

2.3.1.12. Jacket color: Refer to drawings.

2.3.1.13. Mohawk: AdvanceNet Series

2.3.2. OS2 SINGLE MODE - OSP FIBER-OPTIC CABLE:

2.3.2.1. Core / Cladding Size: 8.2/125 micron

2.3.2.2. 1 Gigabit Ethernet Performance:

2.3.2.2.1. 5000m @ 1310nm

2.3.2.3. 10 Gigabit Ethernet Performance:

2.3.2.3.1. 10,000m @ 1310nm

2.3.2.3.2. 40,000m @ 1550nm

2.3.2.4. Max. Attenuation:

2.3.2.4.1. 0.40 dB/km @ 1310nm

2.3.2.4.2. 0.30 dB/km 1550nm

2.3.2.5. Jacket diameter: .410" (based on a 24-Strand cable)

2.3.2.6. Jacket color: Black

2.3.2.7. Jacket Material: PE (Polyethylene)

2.3.2.8. Dielectric Loose-Tube Plenum Rated

2.3.2.9. Fiber Count: Refer to Drawings

2.3.2.10. Water Blocking Material:

2.3.2.10.1. Cable: Gel Filled

2.3.2.10.2. Cable Core: Water Blocking Tape

2.3.2.10.3. Outer Jacket: Water Blocking Aramid Yarns

2.3.2.11. Bend Radius:

2.3.2.11.1. During Installation: 15x Outside Diameter

2.3.2.11.2. During Operations: 10x Outside Diameter

2.3.2.12. Pulling Tension:

2.3.2.12.1. During Installation: 600 lbf Max

2.3.2.12.2. During Operation: 180 lbf Max

2.3.2.13. Crush Resistance: 220N/cm

2.3.2.14. Meets all of the TIA/EIA 568-B.3 specifications

2.3.2.15. Internal Rip Cord: Yes

2.3.2.16. Mohawk: FSSL Series

2.3.3. OM3 MULTIMODE - OSP FIBER-OPTIC CABLE:

2.3.3.1. Core / Cladding Size: 50/125 micron

2.3.3.2. 1 Gigabit Ethernet Performance:

2.3.3.2.1. 1000m @ 850nm

2.3.3.2.2. 550m @ 1300nm

2.3.3.3. 10 Gigabit Ethernet Performance:

2.3.3.3.1. 300m @ 850nm

2.3.3.4. Max. Attenuation:

2.3.3.4.1. 3.0 dB/km @ 850nm

2.3.3.4.2. 1.0 dB/km @ 1300nm

2.3.3.5. Minimum Effective Modal Bandwidth (EMB):

2.3.3.5.1. 2000 MHz-km @ 850nm

2.3.3.6. Minimum Overfilled Launch (OFL) Bandwidth:

2.3.3.6.1. 1500 MHz-km @ 850nm

2.3.3.6.2. 500MHz-km @ 1300nm

2.3.3.7. Jacket diameter: .410" (Based on a 24-Strand)

2.3.3.8. Jacket color: Black

2.3.3.9. Jacket Material: PE (Polyethylene)

2.3.3.10. Dielectric Loose-Tube Plenum Rated

2.3.3.11. Fiber Count: Refer to Drawings

2.3.3.12. Water Blocking Material:

2.3.3.12.1. Cable: Gel Filled

2.3.3.12.2. Cable Core: Water Blocking Tape

2.3.3.12.3. Outer Jacket: Water Blocking Aramid Yarns

2.3.3.13. Bend Radius:

2.3.3.13.1. During Installation: 15x Outside Diameter

2.3.3.13.2. During Operations: 10x Outside Diameter

2.3.3.14. Pulling Tension:

2.3.3.14.1. During Installation: 600 lbf Max

2.3.3.14.2. During Operation: 180 lbf Max

2.3.3.15. Crush Resistance: 220N/cm

2.3.3.16. Meets all of the TIA/EIA 568-B.3 specifications

2.3.3.17. Internal Rip Cord: Yes

2.3.3.18. Mohawk: FS3L Series

2.3.4. OS2 SINGLEMODE - ISP FIBER-OPTIC CABLE:

2.3.4.1. Core / Cladding: 8.2/125 micron

2.3.4.2. 1 Gigabit Ethernet Performance:

2.3.4.2.1. 5000m @ 1310nm

2.3.4.3. 10 Gigabit Ethernet Performance:

2.3.4.3.1. 10,000m @ 1310nm

2.3.4.3.2. 50,000m @ 1550nm

2.3.4.4. Max. Attenuation:

2.3.4.4.1. 0.50 dB/km @ 1310nm

2.3.4.4.2. 0.50 dB/km @ 1550nm

2.3.4.5. Jacket diameter: .330" (Based on a 24-Strand)

2.3.4.6. Jacket color: Yellow

2.3.4.7. Jacket Material: PVC (Polyvinyl Chloride)

2.3.4.8. Dielectric Tight-Tube Plenum Rated

2.3.4.9. Fiber Count: Refer to Drawings

2.3.4.10. Bend Radius:

2.3.4.10.1. During Installation: 15x Outside Diameter

2.3.4.10.2. During Operations: 10x Outside Diameter

2.3.4.11. Pulling Tension:

2.3.4.11.1. During Installation: 300 lbf Max

2.3.4.11.2. During Operation: 90 lbf Max

2.3.4.12. Meets all of the TIA/EIA 568-B.3 specifications

2.3.4.13. Crush Resistance: 100N/cm

2.3.4.14. Cables that are routed in slab, below grade or exposed to the exterior of the building shall have a water blocking properties.

2.3.4.15. Internal Rip Cord: Yes

2.3.4.16. Mohawk: FISD Series

2.3.5. OM3 MULTIMODE - ISP FIBER-OPTIC CABLE:

2.3.5.1. Core / Cladding: 50/125 micron

2.3.5.2. 1 Gigabit Ethernet Performance:

2.3.5.2.1. 1000m @ 850nm

2.3.5.2.2. 550m @ 1300nm

2.3.5.3. 10 Gigabit Ethernet Performance:

2.3.5.3.1. 300m @ 850nm

2.3.5.4. Max. Attenuation:

2.3.5.4.1. 3.0 dB/km @ 850nm

2.3.5.4.2. 1.0 dB/km @ 1300nm

2.3.5.5. Jacket diameter: .330” (Based on a 24-Strand)

2.3.5.6. Jacket color: Aqua

2.3.5.7. Jacket Material: PVC (Polyvinyl Chloride)

2.3.5.8. Dielectric Tight-Tube Plenum Rated

2.3.5.9. Fiber Count: Refer to Drawings

2.3.5.10. Bend Radius:

2.3.5.10.1. During Installation: 15x Outside Diameter

2.3.5.10.2. During Operations: 10x Outside Diameter

2.3.5.11. Pulling Tension:

2.3.5.11.1. During Installation: 300 lbf Max

2.3.5.11.2. During Operation: 90 lbf Max

2.3.5.12. Meets all of the TIA/EIA 568-B.3 specifications

2.3.5.13. Crush Resistance: 100N/cm

2.3.5.14. Cables that are routed in slab, below grade or exposed to the exterior of the building shall have a water blocking properties.

2.3.5.15. Internal Rip Cord: Yes

2.3.5.16. Mohawk: FI3D Series

2.4. PATCH CORDS:

2.4.1. CATEGORY 6:

2.4.1.1. Applications:

2.4.1.1.1. 1000 Base-T (Gigabit ethernet)

2.4.1.1.2. 100 Base-T

2.4.1.1.3. 10 Base-T

2.4.1.1.4. FDDI

2.4.1.1.5. ATM

2.4.1.1.6. POE++ IEEE802.3 bt types 3 and 4 (for 10m patch cord applications)

2.4.1.2. Conductors: 23 AWG, Solid bare copper

2.4.1.3. Insulation: PE (polyethylene)

2.4.1.4. Jacket material: low smoke zero halogen (flame retardant)

2.4.1.5. Wiring scheme: manufactured using T568B wiring format. Function suitably for either T568A or T568B wiring schemes. T568A or T568B compatibility

2.4.1.6. Connector:

2.4.1.6.1. Polycarbonate RJ45 (Mated Connection with a durability of 750 cycles)

2.4.1.6.2. Snagless PVC Boot

2.4.1.6.3. Phosphor Bronze w/ 50 micro-inches gold plating (for each blade)

2.4.1.6.4. Factory Terminated (Both Ends)

2.4.1.7. Color: Patch cords shall be supplied in the following color: blue

2.4.1.8. Compatibility: With existing Category 3, 5, and 6 cabling systems for fit, form, and function.

2.4.1.9. Bend Radius (Overall Cable): 25mm

2.4.1.10. Length: Provide as required.

2.4.1.11. Beldon Part Number: C62410 Series

2.4.2. OS2 SINGLEMODE:

2.4.2.1. Core / Cladding: 8.2/125 micron

2.4.2.2. Connector (Both Ends):

2.4.2.2.1. Duplex “LC”

2.4.2.2.2. Blue plastic housing

2.4.2.2.3. Zirconia Ceramic Ferrule

2.4.2.2.4. Rubber Boot

2.4.2.3. Cable OD: 2.0 mm x 4.0 mm

2.4.2.4. Jacket Color: Yellow

2.4.2.5. Fiber Count: 2-Strand

2.4.2.6. Insertion Loss (Both Ends):

2.4.2.6.1. Maximum: .25 dB

2.4.2.7. Return Loss (Both Ends):

2.4.2.7.1. Minimum: 55 dB

2.4.2.8. Bend Radius:

2.4.2.8.1. During Installation: 15x Outside Diameter

2.4.2.8.2. During Operations: 10x Outside Diameter

2.4.2.9. Length: Provide as required.

2.4.2.10. Beldon Part Number: FPSLDLD Series

2.4.3. OM3 MULTIMODE:

2.4.3.1. Core / Cladding: 50/125 micron

2.4.3.2. Connector (Both Ends):

2.4.3.2.1. Duplex “LC”

2.4.3.2.2. Aqua plastic housing

2.4.3.2.3. Zirconia Ceramic Ferrule

2.4.3.2.4. Rubber Boot

2.4.3.3. Cable OD: 1.6 mm x 3.2 mm

2.4.3.4. Jacket Color: Aqua

2.4.3.5. Fiber Count: 2-Strand

2.4.3.6. Insertion Loss (Both Ends):

2.4.3.6.1. Maximum: .25 dB

2.4.3.7. Return Loss (Both Ends):

2.4.3.7.1. Minimum: 30 dB

2.4.3.8. Bend Radius:

2.4.3.8.1. During Installation: 15x Outside Diameter

2.4.3.8.2. During Operations: 10x Outside Diameter

2.4.3.9. Length: Provide as required.

2.4.3.10. Beldon Part Number: FP3LDLD Series

2.5. TELECOMMUNICATION EQUIPMENT:

2.5.1. BACKBOARDS:

2.5.1.1. A minimum of one wall should be covered with ¾", A-C grade plywood.

2.5.1.2. This plywood shall be coated with UL Classified Intumescent Fire Retardant Latex tested to UL723, to meet applicable codes and securely fastened to the wall.

2.5.1.3. The plywood will be installed to give up to 8 ft of vertical workspace on the wall and shall be 6 inches off the finished floor.

2.5.1.4. The wall should be gray or light in color to enhance room lighting.

2.5.1.5. The system must contain a label that details the plywood grade and UL classified fire-retardant latex paint. All labels will be left exposed and unpainted.

2.5.1.6. Pathway and Spaces, Inc. Part Number RB-AWALLxG (x=length of the wall in feet) or equal.

2.5.2. 2-POST RACK:

2.5.2.1. Refer to drawings for rack locations and quantities. Rack shall be assembled and installed per the manufacture's requirements and recommendations.

2.5.2.2. Material: Extruded Aluminum

2.5.2.3. Color: Durable polyurethane powder coated (Black)

2.5.2.4. Weight Capacity:

2.5.2.4.1. Unsecured: 500 lbs

2.5.2.4.2. Secured: 1000 lbs

2.5.2.5. Mounting Width: 19”

2.5.2.6. Mounting Hole Pattern: #12-24 thread size. Coating shall not interfere with thread fit.

2.5.2.7. Rack Units: 45 RU with each rack unit numbered on rack, unless noted otherwise on the drawings.

2.5.2.8. Height: 84”, unless noted otherwise on the drawings.

2.5.2.9. Hubbell Part Number: HPW Series

2.5.3. RACK ISOLATION PAD:

2.5.3.1. Each rack shall be provided with an isolation pad and anchor bolts. Isolation pad and anchor bolts shall be installed per the manufacture’s requirements and recommendations.

2.5.3.2. Pad Material: Polyester Fiberglass

2.5.3.3. Anchor bolts: Cement Anchors and Isolation Bushings

2.5.3.4. Hubbell Part Number: HRRP Series

2.5.4. VERTICAL CABLE MANAGERS:

2.5.4.1. Vertical cable managers shall be provided at each rack location. Each rack shall have one manager on each side of the rack. If the racks are within a row two racks can share a common manager between the two (refer to drawings). The vertical cable manager shall maintain separation between patch panels/equipment/jumper cords and premise cables and allow for pass through locations. Vertical cable managers shall be installed per the manufacturer’s requirements and recommendations.

2.5.4.2. Material: Manufactured from 14 gauge cold rolled steel (CRS). With an aluminum door and plastic spools.

2.5.4.3. Color: Powder Coated (Black)

2.5.4.4. Mounting: Bolt to the rack with included hardware.

2.5.4.5. Height: Sized for the rack its serving.

2.5.4.6. Management System Type: Double Sided

2.5.4.7. Access: Front and Rear hinged access doors. Doors shall be removable, hinge one way, and reversible to open from the right or left side. The cover shall attach to the cable guides/rungs via a three-point hinge connection and shall snap on at two-points to secure the cover. The rear door on double-door cable managers shall be the same as the front door.

2.5.4.8. Dimensions: The front side shall be a c-shaped 6” wide by 7.23” deep channel with a hinging cover and l-shaped cable guides positioned every 2 rack units. The rear side shall include (5) cable rungs, 6” wide by 6.33” deep, and (6) 6” deep spools.

2.5.4.9. Cable Guides: Cable guides and cable rungs shall be made from steel and shall be round cross section to protect cables.

2.5.4.10. Hubbell Part Number: VME Series

2.5.5. HORIZONTAL CABLE MANAGERS:

2.5.5.1. Refer to drawings for rack configurations.

2.5.5.2. 1RU horizontal cable manager (HM) shall be provided for every 1RU of space utilized for patch panel or switch (PP or S). Horizontal cable managers shall be installed per the manufacturer's requirements and recommendations.

2.5.5.3. Examples:

2.5.5.3.1. One 24 PP (1 RU) will have one 1RU HM.

2.5.5.3.2. Two 48 PP (2RU each) will have one 1RU HM above the first 48 PP (2RU), one 2RU HM between first and second 48 PP (2RU) and one 1RU HM below the second 48 PP (2RU).

2.5.5.3.3. Three 48 PP (2RU each) will have one 1RU HM above the first 48 PP (2RU), one 2RU HM between first, second and third 48 PP (2RU) and one 1RU HM below the third 48 PP (2RU).

2.5.5.4. Material: Manufactured from 16 gauge cold-rolled steel (CRS).

2.5.5.5. Color: Powder Coated (Black)

2.5.5.6. Access: Hinged cover with the capability to lock in place when completely open.

2.5.5.7. Management Type: Pass-Through Holes with rolled edges.

2.5.5.8. Front Ring Depth: 7"

2.5.5.9. Hubbell Part Number: HM Series.

2.5.6. BLANK FILLER PLATE:

2.5.6.1. Refer to drawings for configurations. Blank plates shall be installed per the manufacturer's requirements and recommendations.

2.5.6.2. Material: Manufactured from 14 gauge cold-rolled steel (CRS).

2.5.6.3. Color: Powder Coated (Black)

2.5.6.4. Hubbell Part Number: MCCBP Series

2.5.7. PATCH PANEL:

2.5.7.1. Refer to drawings for rack configurations.

2.5.7.2. Patch panels shall be installed per the manufacturer's requirements and recommendations.

2.5.7.3. The panels shall be black powder coated manufactured from 14 gauge cold rolled steel (CRS) and contain a wire management bar with rolled edges top and bottom for proper stiffness.

2.5.7.4. Be field configurable.

2.5.7.5. Panels shall have individual port identification numbers on the front and rear of the panel.

2.5.7.6. Jacks are constructed of high impact thermoplastic (UL 94v-0) with zinc die-cast rear.

2.5.7.7. Have a keystone opening of .676" X .575"

2.5.7.8. Jacks shall meet or exceed category transmission requirements for connecting hardware, as specified in TIA-568.2-D, TIA-568.2-D-1, TIA-568.2-D-2, balanced twisted-pair telecommunications cabling, and components standards.

2.5.7.9. Supports short links, less than 10 meters.

2.5.7.10. The manufacturer shall provide component compliance certificates from third party testing organizations upon request.

2.5.7.11. Design and tested for 1.5a of continuous current per pair. Panels shall be tested to 150% of IEEE 802.3bt DTE power specification with no degradation of performance or materials.

2.5.7.12. Jacks shall meet or exceed the 4-connector channel performance requirements, per the TIA-568.2-D, TIA-568.2-D-1, TIA-568.2-D-2 standard.

2.5.7.13. Modular jack contacts shall accept a minimum of 750 mating cycles without degradation of electrical or mechanical performance.

2.5.7.14. Jacks shall have the category rating designation visible from the front when installed.

2.5.7.15. Jacks shall terminate 24 to 22 AWG solid conductors with up to.050-inch insulation.

2.5.7.16. All transmission performance parameters shall be independently verified by a UL or ETL third party testing organization.

2.5.7.17. Density:

2.5.7.17.1. 1RU = 24 ports

2.5.7.17.2. 2RU = 48 ports

2.5.7.18. Hubbell Part Number:

2.5.7.18.1. UTP (HPJ Series)

2.5.7.18.2. Shielded (HPJS Series)

2.5.8. FIBER OPTIC ENCLOSURE – RACK MOUNT:

2.5.8.1. Rack mounted fiber optic enclosures shall be provided with the required accessories and installed per the manufacturer’s requirements and recommendations.

2.5.8.2. Rack-mounted, black powder coated formed 16 gauge cold rolled steel (CRS) enclosure.

2.5.8.3. Provide required fiber splice trays.

2.5.8.4. Pull-out inner tray shall provide access to inner cables and connections and maintain proper cable bend radius throughout the range of motion.

2.5.8.5. Easy access slides out top covers give quick access to the connectors front and rear.

2.5.8.6. The 17-inch depth maximizes space for interconnections, splice trays and cable storage.

2.5.8.7. The inner tray lances shall accept Velcro straps to secure splice trays.

2.5.8.8. The plexiglass front and rear doors permit internal access, while improving dust shielding and tamper resistance.

2.5.8.9. A user-friendly clip-on labeling system facilitates administration and accepts user-generated labels.

2.5.8.10. Panel mounting brackets shall be configurable to either 19" or 23" racks per ANSI/EIA-310-D.

2.5.8.11. Inner tray mounting posts for modular panels shall accept FSP adapter panels, splice cassettes and MPO-style cassettes for "plug & play" installation.

2.5.8.12. The inner tray shall have rear cable tie-down features to accept various diameter backbone cables entering the enclosure.

2.5.8.13. Integral cable management kit.

2.5.8.14. Rack Units: Refer to drawings.

2.5.8.15. Hubbell Part Number: FCR Series.

2.5.9. FIBER OPTIC ENCLOSURE – WALL MOUNT:

2.5.9.1. Wall mounted fiber optic enclosures shall be provided with the required accessories and installed per the manufacturer's requirements and recommendations.

2.5.9.2. Rack-mounted, black powder coated formed 16 gauge cold rolled steel (CRS) enclosure.

2.5.9.3. Two compartment to separate network terminations and distribution terminations with double door enclosure.

2.5.9.4. Top and bottom entry points with cable entry tie down points.

2.5.9.5. Integral cable management kit.

2.5.9.6. Number of Fiber: Refer to drawings.

2.5.9.7. Hubbell Part Number: FCW Series.

2.5.10. FIBER SPLICE CASSETTE:

2.5.10.1. Fiber splice cassettes shall be provided with the required accessories and installed per the manufacturer's requirements and recommendations.

2.5.10.2. Provide quantity as required based on the provided fiber strands. Refer to drawings.

2.5.10.3. A single line item includes a splice tray housing, adapter panel, pigtails, splice holder and sleeves.

2.5.10.4. Enhanced management of pigtails and fiber slack storage.

2.5.10.5. Clean installations and quick repairs.

2.5.10.6. Flexible installation for small fiber-count requirements

2.5.10.7. Connectors: Duplex “LC” with Zirconia Ceramic sleeves.

2.5.10.8. Any unused ports shall be capped.

2.5.10.9. Color:

2.5.10.9.1. OS2: Blue

2.5.10.9.2. OM3: Aqua

2.5.10.10. Hubbell Part Number: OCSPSCD Series.

2.5.11. GROUNDING BUSABR – PRIMARY BONDING BUSBAR (PBB):

2.5.11.1. The PBB shall have all accessories provided and installed per the manufacturers requirements and recommendations.

2.5.11.2. The PBB must be provided with holes for use with correctly matched listed lugs and hardware. No solid busbars that the contractor drills the holes in will be permitted.

2.5.11.3. The busbars shall be made of copper or copper alloys having a minimum of 95% conductivity when annealed as specified by the international annealed copper standard (IACS). Tin plating is allowed.

2.5.11.4. Dimensions:

2.5.11.4.1. 4.0”W x 20”L x .25”T

2.5.11.5. The busbar must be UL listed and tested by a nationally recognized testing laboratory.

2.5.11.6. The busbar will be insulated from its support and maintain a 2” minimum clearance from the wall.

2.5.11.7. Hubbell Part Number: HBBB14420J

2.5.12. GROUNDING BUSABR – SECONDARY BONDING BUSBAR (SBB):

2.5.12.1. The SBB shall have all accessories provided and installed per the manufacturers requirements and recommendations.

2.5.12.2. The SBB must be provided with holes for use with correctly matched listed lugs and hardware. No solid busbars that the contractor drills the holes in will be permitted.

2.5.12.3. The busbars shall be made of copper or copper alloys having a minimum of 95% conductivity when annealed as specified by the international annealed copper standard (IACS). Tin plating is allowed.

2.5.12.4. Dimensions:

2.5.12.4.1. 2.0”W x 10”L x .25”T

2.5.12.5. The busbar must be UL listed and tested by a nationally recognized testing laboratory.

2.5.12.6. The busbar will be insulated from its support and maintain a 2” minimum clearance from the wall.

2.5.12.7. Hubbell Part Number: HBBB14210A

2.5.13. GROUNDING COMPONENTS:

2.5.13.1. Refer to drawings for layout and additional information. Grounding accessories shall be provided and installed per the manufacturer’s requirements and recommendations.

2.5.13.2. Components:

2.5.13.2.1. Vertical rack busbar

2.5.13.2.2. Horizontal rack busbar

2.5.13.2.3. Conductor brackets

2.5.13.2.4. Lugs

2.5.13.2.5. C - Taps

2.5.13.2.6. Rack bonding jumper kits

2.5.13.2.7. Ladder rack bonding jumper

2.5.13.2.8. 3M Scotchlok shield bond connector

2.5.13.2.9. Labels

2.6. CONNECTING HARDWARE:

2.6.1. MODULAR JACKS:

2.6.1.1. Modular jacks shall be provided and installed per the manufacturer’s requirements and recommendations.

2.6.1.2. The jacks shall be a standard 8-position, RJ-45 style, un-keyed, IEC 60603-7 - compliant receptacle.

2.6.1.3. Jacks shall be designed for 4-pair, 100 ohm balanced unshielded twisted pair (UTP) cable.

2.6.1.4. Each jack shall be single unit construction, to snap fit into keystone opening (.676" X .575")

2.6.1.5. Jacks shall have attached wiring instruction labels to allow either T568A or T568B wiring configurations.

2.6.1.6. Jacks shall have shielding properties to protect from electromagnetic interference and alien crosstalk (ANEXT).

2.6.1.7. Jack termination shall only require a cable stripper and industry standard flush cutters. Jack termination method does not use a 110-impact termination tool or any manufacturer specific tools. Jack termination will be able to be performed by hand.

2.6.1.8. The wire manager is supplied to organize and secure wires prior to termination completion.

2.6.1.9. Jack termination shall lock in place with an audible snap and require a use of a small screwdriver to unlock.

2.6.1.10. Jacks shall have the Category 6 designation, visible from the front when installed.

2.6.1.11. Jacks shall terminate 24-22 AWG solid conductors, with insulated outside conductors' diameters up to .050".

2.6.1.12. Jacks shall be compatible with ANSI/TIA-606 color code labeling.

2.6.1.13. Category 6 jacks are backward compatible with existing Category 3, 5, 5e cabling systems for fit, form, and function.

2.6.1.14. All transmission performance parameters shall be independently verified by a UL or ETL third party testing organization.

2.6.1.15. All jacks are tested to 150% of IEEE 802.3bt DTE Power specification with no degradation of performance or materials.

2.6.1.16. Each jack is component rated per ANSI/TIA-568-2.D.

2.6.1.17. Color: Refer to drawings.

2.6.1.18. Hubbell Part Number: HJU6 Series

2.6.2. FIBER OPTIC CONNECTORS:

2.6.2.1. Fiber optic connectors shall be provided and installed per the manufacturer's requirements and recommendations.

2.6.2.2. Factory pre-polished Duplex "LC" connectors shall require no field polishing and require no adhesive for termination.

2.6.2.3. Provided with zirconium ceramic ferrule.

2.6.2.4. Index-matching gel is factory-injected into the cleaved fiber stub splice to minimize connector insertion loss.

2.6.2.5. Material shall be designed and compliant with the following standards:

2.6.2.5.1. ANSI/TIA-568.3-E

2.6.2.5.2. TELCORDIA GR-326

2.6.2.5.3. IEC61754-20 A

2.6.2.5.4. TIA-604-10

2.6.2.6. Connector design and termination technique shall be independent of cable type or manufacturer and shall be compatible for either 900 micron buffer of 250 micron buffer distribution cables.

2.6.2.7. After termination to qualified cables, connectors shall meet 10 gb/s ethernet performance requirements of IEEE802.3.

2.6.2.8. After termination to qualified cables, connectors shall exceed the mechanical and environmental performance requirements of ANSI/TIA-568.3-E.

2.6.2.9. Color:

2.6.2.9.1. Singlemode: Blue

2.6.2.9.2. OM3 Multimode: Aqua

2.6.2.10. Hubbell Part Number: PROclick Series

2.6.3. FACEPLATES:

2.6.3.1. Faceplates shall be and installed per the manufacturer’s requirements and recommendations.

2.6.3.2. Rear loading w/designation window

2.6.3.3. Constructed of high impact, UL94 V-0 rated thermoplastic.

2.6.3.4. Compatible with standard NEMA openings and boxes.

2.6.3.5. Dimensions:

2.6.3.5.1. Single gang 2.75" w x 4.5" h (69.8 mm x 114.3 mm)

2.6.3.6. Port size in each faceplate shall fit the category rated modular jack or snap-fit fiber optic, audio, and video modules for multimedia applications.

2.6.3.7. Faceplates shall be provided with clear plastic and color-matched label field covers. Faceplates shall provide ANSI/TIA-606-D compliant workstation outlet labeling.

2.6.3.8. #6-32 pan head phillips/slotted mounting screws shall be included with each faceplate.

2.6.3.9. Faceplates shall be UL listed and CSA certified.

2.6.3.10. Color: Refer to drawings.

2.6.3.11. Hubbell Part Number: AFP14 Series.

2.6.4. WALL PHONES:

2.6.4.1. Faceplate shall be and installed per the manufacturer's requirements and recommendations.

2.6.4.2. Stainless steel type 422

2.6.4.3. Mounting keystones for mounting phones.

2.6.4.4. Dimensions:

2.6.4.4.1. Single gang 2.75" w x 4.5" h (69.8 mm x 114.3 mm)

2.6.4.5. #6-32 pan head phillips/slotted mounting screws shall be included with each faceplate.

2.6.4.6. Hubbell Part Number: P630S1G Series.

2.6.5. SURFACE MOUNT BOX (BISCUIT JACK):

2.6.5.1. Surface mount boxes shall be installed per the manufacturer's requirements and recommendations.

2.6.5.2. Surface mount boxes shall be constructed of high impact, UL94 v-0 rated thermoplastic.

2.6.5.3. Port size in each surface mount box shall fit the Category rated modular jack.

2.6.5.4. Each surface mount box shall provide for ANSI/TIA-606-B compliant workstation outlet labeling.

2.6.5.5. Surface mount boxes shall be UL listed and CSA verified.

2.6.5.6. Number of Ports: Refer to drawings.

2.6.5.7. Hubbell Part Number: HSB Series.

2.6.6. PLUG – CATEGORY 6:

2.6.6.1. Plugs shall be provided and installed per the manufacturer's requirements and recommendations.

2.6.6.2. Category 6 shielded plug with Cobra- Lock Termination.

2.6.6.3. Rugged die-cast housing supports shielded and non-shielded applications.

2.6.6.4. Category 6 channel compliant.

2.6.6.5. Wires secured under constant compression.

2.6.6.6. Made for direct connect into electronic devices.

2.6.6.7. Cord compression nut provides uniform pressure and superior strain relief.

2.6.6.8. Easily re-terminated

2.6.6.9. Hubbell Part Number: SP6

2.6.7. 90 DEGREE PLUG – CATEGORY 6:

2.6.7.1. Plugs shall be provided and installed per the manufacturer's requirements and recommendations.

2.6.7.2. Rugged die-cast housing supports shielded an non-shielded applications.

2.6.7.3. Category 6 channel compliant.

2.6.7.4. Cable exit direction adjustable in 90-degree increments.

2.6.7.5. Easily re- terminate.

2.6.7.6. Cord compression nut provides uniform pressure and superior strain relief.

2.6.7.7. Hubbell Part Number: SP690

2.7. PATHWAYS:

2.7.1. LADDER RACK:

2.7.1.1. Ladder racks shall be installed within the telecommunication rooms and be installed per the manufacturer's requirements and recommendations.

2.7.1.2. Material: 16-gauge tubular steel

2.7.1.3. Color: Durable Powder Coated (Black)

2.7.1.4. Width: 18", unless noted otherwise on drawings.

2.7.1.5. Weight Capacity: 45 lbs/ft

2.7.1.6. Nema Rating: Heavy Duty

2.7.1.7. Stringer Dimensions: .375" W x 1.5" H

2.7.1.8. Rungs: Welded, 9" O.C, 1" W x 1/2" H tubular, .065" wall thickness.

2.7.1.9. Hubbell Part Number: HLS Series

2.7.2. LADDER TRAY ACCESSORIES:

2.7.2.1. Refer to drawings for layout and additional information. Ladder tray accessories shall be provided and installed per the manufacturer's requirements and recommendations. Components shall be sized based on the ladder tray being provided. Ladder tray accessories shall be of the same manufacturer as the tray.

2.7.2.2. Material: 16-gauge tubular steel

2.7.2.3. Color: Durable Powder Coated (Black)

2.7.2.4. Nema Rating: Heavy Duty

2.7.2.5. Components:

2.7.2.5.1. Butt splice kits

2.7.2.5.2. T-Junction splice kit

2.7.2.5.3. Vertical wall brackets

2.7.2.5.4. J-Bolt kits

2.7.2.5.5. Elevation kits

2.7.2.5.6. Rack mounting kits

2.7.2.5.7. Foot kits

2.7.2.5.8. Triangle wall supports

2.7.2.5.9. Wall angle supports

2.7.2.5.10. Tray radius drops.

2.7.2.5.11. Protective end caps

2.7.3. Power Supply

2.7.3.1. Dedicated power modules support full 48 ports on panels one and two primary power and a 3rd current sharing redundant power supply real time reserve.

2.7.3.2. Power supply chassis shall have capacity for three 48v power modules. Two 48v power modules shall provide full power for up to 48 ports. An independent third power module shall provide live load sharing redundant power for the primary power modules.

2.7.3.3. Power modules shall have an AC power source On/Off switch Power modules shall have an LED indicator to show active state of the power module.

2.7.3.4. The power supply chassis shall be accompanied by rack mounting flanges allowing either forward or backward facing installation.

2.7.3.5. Each power module shall have an integrated, temperature sensing, multi-speed cooling fan to minimize fan noise.

2.7.3.6. Control logic power modules shall supply enough power for up to two 24-port panels to support:

2.7.3.6.1. Simultaneous PoE and Asset Management control function

2.7.3.6.2. All port level, power module and status LED’s

2.7.3.6.3. Simultaneous power for up to 96 total electronic asset tags

2.7.3.6.4. Control logic power module shall be rated to support all asset tag, PoE and asset management control logic functionality for all panels attached to the power supply chassis at no more than 80% of total power module capacity.

2.7.3.7. A scaleable, rack-mount power supply chassis, 48v power modules, and power cords shall be available separately.

2.7.3.8. Power Supply (PS) Chassis. Hubbell Premise Wiring Part Number: DTXPS

2.7.3.9. PS 5v Power Brick. Hubbell Premise Wiring Part Number: DTXPM60

2.7.3.10. PS 350W/48V Power Brick. Hubbell Premise Wiring Part Number: DTXPM350

2.7.3.11. Accessories:

2.7.3.11.1. DC Power Cables, 3' (between PowerTrac and Power Supply chassis) Hubbell Premise Wiring Part Number: DTXP03

2.7.3.11.2. DC Power Cables, 7' (between PowerTrac and Power Supply Chassis) Hubbell Premise Wiring Part Number: DTXP07

2.7.3.11.3. Power Cord 18" IEC320 C14 to IEC320 C13 Hubbell Premise Wiring Part Number: ICKXA

2.7.3.11.4. Power Cord 15" NEMA 5-15P to IEC320 C13 Hubbell Premise Wiring Part Number: ICKXB

2.7.3.11.5. Power Cord 30" NEMA L5-30P (TWISTLOCK®) to IEC320 C13 Hubbell Premise Wiring Part Number: ICKXC

2.7.4. Command Module & Asset Management Accessories:

2.7.4.1. Direct network command, communication and control of the panel shall not be allowed. Network management will be performed via a secure and independent Command Module.

2.7.4.2. Manages up to 15 PowerTrac panels as a stack

2.7.4.3. Local data collection and panel management Command Module monitors and enforces policy for up to 15 panels, 360 PoE enabled ports and 720 managed assets.

2.7.4.4. State-of-the-art tracking system uses the LAN infrastructure for real-time asset control. Assets are tracked even when powered off. No TCP/IP session required. Track network and non-network assets alike. Tracking data by monitoring asset

connection, disconnection and movement throughout the network by capturing and storing in an Open DataBase Connectivity (ODBC) transactional database for reporting, analysis and policy enforcement.

2.7.4.5. Alerts can be sent directly to pagers, cell phones, email addresses.

2.7.4.6. E911 Solution. The ability of PowerTrac managed assets to be located within the infrastructure assists with e911 compliance

2.7.4.7. Single IP stack identity reduces address space consumption.

2.7.4.8. Reduced network management traffic.

2.7.4.9. Web based user interface

2.7.4.10. ODBC database is SQL compliant.

2.7.4.11. Open DB scheme integrates easily with other systems.

2.7.4.12. Command module, control cords, and electronic asset tags and electronic identifiers shall be available separately to configure asset management functions.

2.7.4.13. Command Module (CM) Hubbell Premise Wiring Part Number: DTXCM

2.7.4.14. Accessories:

2.7.4.14.1. CM Control Cord 3’. Hubbell Premise Wiring Part Number: DTXCC03

2.7.4.14.2. CM Control Cord 7’. Hubbell Premise Wiring Part Number: DTXCC07

2.7.4.14.3. CM Control Cord 10’. Hubbell Premise Wiring Part Number: DTXCC10

2.7.4.14.4. CM Cable Management. Hubbell Premise Wiring Part Number: DTXCMB

2.7.4.14.5. Electronic Identification Key asset tag. Hubbell Premise Wiring Part Number: DTXK

2.7.4.14.6. Electronic Asset Tag replacement/addition. Hubbell Premise Wiring Part Number: DTXT

2.7.4.14.7. Asset Tag Extension 1' Cable and Tether Assembly. Hubbell Premise Wiring Part Number: DTXTE01

2.7.4.14.8. Asset Tag Extension 3' Cable and Tether Assembly. Hubbell Premise Wiring Part Number: DTXTE03

2.7.4.14.9. Asset Tag Extension 5' Cable and Tether Assembly. Hubbell Premise Wiring Part Number: DTXTE05

2.7.4.14.10. Electronic Asset Tag Coupler For user device identification. (Includes 1 Electronic Asset Tag and connection cable) Hubbell Premise Wiring Part Number: DTXD

3. EXECUTION

3.1. INSTALLATION STANDARDS:

3.1.1. Comply with BICSI TDDM, TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3, and TIA/EIA-569-A.

3.1.2. Always wear an ESD wrist strap during installation to avoid damage to circuitry from electrostatic discharge (ESD).

3.1.3. Avoid wearing jewelry (including rings and chains) or other items that could get caught in the power chassis. Avoid wearing any loose clothing, or securely fasten items such as ties, scarves, or sleeves.

3.1.4. Locate the emergency power-off switch for the room in which you are working before beginning installation.

3.1.5. Do not work alone when potentially hazardous conditions exist.

3.1.6. Examine your work area carefully for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

3.2. EXAMINATION:

3.2.1. Examine pathway elements intended for cables and connectivity.

3.2.2. Verify proposed routes of pathways. Check raceways, cable trays, and other elements for compliance with space allocations, clearances, installation tolerances, hazards to cable installation, and other conditions affecting installation. Verify that cabling can be installed complying with EMI clearance requirements.

3.2.3. Prepare wall penetrations and verify that penetrations of rated fire walls are made using products labeled for type of wall penetrated.

3.2.4. Identify plan to support cables and raceways in suspended ceilings. Verify weight of individual types and sizes of cables Verify that load capacity of cable support structures is adequate for each pathway

3.2.5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2.6. Examine packages for any damage and confirm that all the appropriate items are enclosed in the package.

3.2.6.1. Verify that you received all listed equipment.

3.2.6.2. Consider retaining a small collection of shipping containers for the unlikely event that you need to move or ship the product in the future.

3.3. SITE PREPERATION:

3.3.1. Secure Telecommunication Rooms. Make sure access to these locations are locked and admittance is restricted to only those that need to be in the room.

3.3.2. Install backboards on walls of telecommunications rooms.

3.4. INSTALLATION:

3.4.1. CABLES:

3.4.1.1. A minimum of two cables will be installed to each workstation location. Okaloosa County Schools has standardized on Four-Pair, Category 6, UTP cables. Situations may require the use of an alternative cable and this will be done on a case-by-case basis.

3.4.1.2. Wiring Method: Install cables in raceway and cable tray except within cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum

cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces

3.4.1.3. Separation 'from EMI Sources: Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment. Comply with the following minimum separation distances from possible sources of EMI:

3.4.1.3.1. Separation between unshielded power lines or electrical equipment in proximity to open cables or cables in nonmetallic raceways is as follows:

3.4.1.3.1.1. Electrical Equipment Rating Less Than 2 kVA: 5 inches (127 mm).

3.4.1.3.1.2. Electrical Equipment Rating between 2 and 5 kVA: 12 inches (300mm).

3.4.1.3.1.3. Electrical Equipment Rating More Than 5 kVA: 24 inches (610 mm).

3.4.1.3.2. Separation between unshielded power lines or electrical equipment in proximity to cables in grounded metallic raceways is as follows:

3.4.1.3.2.1. Electrical Equipment Rating Less Than 2 kVA: 2-1/2 inches (64 mm).

3.4.1.3.2.2. Electrical Equipment Rating between 2 and 5 kVA: 6 inches (150 mm).

3.4.1.3.2.3. Electrical Equipment Rating More Than 5 kVA: 12 inches (300 mm).

3.4.1.3.3. Separation between power lines and electrical equipment located in grounded metallic conduits or enclosures in proximity to cables in grounded metallic raceways is as follows:

3.4.1.3.3.1. Electrical Equipment Rating Less Than 2 kVA: No requirement.

3.4.1.3.3.2. Electrical Equipment Rating between 2 and 5 kVA- 3 inches (76 mm).

3.4.1.3.3.3. Electrical Equipment Rating More Than 5 kVA: 6 inches (150 mm).

3.4.1.3.4. Electrical Motors and Transformers, 5 kVA or HP and Larger: 48 inches (1200 mm).

3.4.1.3.5. Fluorescent Fixtures: 5 inches (127 mm).

3.4.1.4. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible

3.4.1.5. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.

3.4.1.6. Pulling Cable: Do not exceed manufacturer's written recommended pulling tensions. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

3.4.1.7. Cold-Weather Installation: Bring cable to room temperature before de-reeling Heat lamps shall not be used for heating.

3.4.1.8. Secure and support cables at intervals not exceeding 60 inches

3.4.1.9. Install UTP cables using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end

3.4.1.10. Horizontal cabling of the proper category shall be fully deployed from the TR to each wall plate location according to applicable codes and standards.

3.4.1.11. Cable slack, service coil, bend radii, and pathway fill ratio shall comply with applicable codes and standards.

3.4.1.12. Cable ends for termination shall be clean and free from crush marks, cuts, or kinks left from pulling operations.

3.4.2. PATHWAYS:

3.4.2.1. Conduit:

3.4.2.1.1. Comply with TIA/EIA-569-B for maximum length of conduit and bends between pull points, and for pull-box sizing.

3.4.2.1.2. A horizontal conduit system consists of conduits radiating from the telecommunications room to the workstation outlets in the floor, walls, ceilings, and columns of a building. When using a conduit distribution system utilize the most direct route following the building lines.

3.4.2.1.3. Metallic horizontal cable pathways shall be bonded to an approved ground according to ANSI-J-STD-607-A.

3.4.2.1.4. Conduit is only required if building codes or environmental conditions necessitate it. Rigid or EMT metal conduits are deemed suitable for

building installation. Adequate planning should allow for a minimum of one 3/4-inch conduits to each workstation location if code requires conduit for voice and data cables.

3.4.2.1.5. Conduit fill ratios shall not exceed 40%; contact your cable manufacturer to get recommendation on fill rates.

3.4.2.1.6. No conduit run should be designed with more than two (2), 90 degree bends between pull points or pull boxes. If a run requires more than two

90 degree bends, install a pull box. An exception will be allowed if the total run is not longer than 33 ft or one of the bends is located within 12 in. of the cable feed end or the conduit is increased to the next trade size.

3.4.2.1.7. All conduits will be equipped with a contiguous length of plastic or nylon pull string with a minimum rating of 200 lbs. (90 Kg)

3.4.2.1.8. A conduit run should not be designed with continuous closed sections longer than 100 ft without pull points or pull boxes installed.

3.4.2.1.9. Conduit Bend Radii - 2" or less – 6 times the internal diameter of the conduit or more than 2" – 10 times the internal diameter of the conduit

3.4.2.1.10. All conduits should terminate above or in the installed ladder racks and allow for proper cable racking. Cable waterfalls should be considered in areas that have excessive distance between the conduit and ladder rack.

3.4.2.1.11. Conduits entering through a wall shall be reamed and bushed, and terminated as close as practicable to the terminating rack or wall

3.4.2.1.12. Conduits terminating above a suspended ceiling must terminate not less 3 inches above finished ceiling and finished with bushing opening.

3.4.2.1.13. All conduit will be labeled for easy identification

3.4.2.2. J-hooks

3.4.2.2.1. J-hooks shall be located at intervals not to exceed 60 in.

3.4.2.2.2. Do not exceed the manufacturers recommended capacity of an installed j-hook.

3.4.2.2.3. Select the appropriate J-hook to accommodate the immediate and anticipated quantity, weight, and performance requirements of cables.

3.4.2.2.4. Utilize independent ceiling support rod or wire to mount appropriate cable fasteners loaded with multiple cables up to the total weight for which the fastener is approved.

3.4.2.2.5. The fastener design shall not interfere with the inserting or removing of the ceiling tile.

3.4.3. CATEGORY 6 RJ45 JACK:

3.4.3.1. Terminate jacks according to manufacturer's instructions.

3.4.3.2. To maximize transmission performance, maintain wiring pair twists as close as possible to the point of termination.

3.4.3.3. The length of wiring pair un-twist in each termination shall be less than 0.5 inches (13 mm).

3.4.3.4. Jacks shall be properly mounted in plates, frames, or housings with stuffer cap fully installed over IDC contacts.

3.4.3.5. Horizontal cables extending from mounted jacks shall maintain a minimum bend radius of at least 4 times the cable diameter.

3.4.3.6. Cable terminations shall have no tensile or bending strain on IDC contacts after assembly of faceplate or housing to the wall outlet.

3.4.4. POWERTRAC SYSTEM INTERCONNECT SYSTEM:

3.4.4.1. Manufacturer’s installation instructions shall be followed.

3.4.4.2. For installation in accordance with national and/or local electrical codes.

3.4.4.3. Only trained and qualified personnel should install, replace, or service this equipment.

3.4.4.4. Keep tools and PowerTrac system components away from foot traffic.

3.4.4.5. Site Environmental Requirements

3.4.4.5.1. Before installing the system, read this section to familiarize yourself with the proper site and environmental conditions. Failure to read and follow these guidelines could lead to an unsuccessful installation and possible damage to the system and components.

3.4.4.5.2. Planning is essential for successful system operation. You should decide in advance a proper location for the PowerTrac System Components, asset tag location and configuration (if applicable) and layout for your equipment rack or wiring closet. You should install the Panels, Command Modules and Power Supply Chassis’ in an enclosed, secure area, ensuring that only qualified personnel have access to the system components and control of the environment.

3.4.4.5.3. Equipment that is placed too closely together or that is inadequately ventilated can cause system over-temperature conditions. In addition, poor equipment placement can make chassis panels inaccessible and difficult to maintain. The system requires a dry, clean, well ventilated, and air-conditioned environment. To ensure normal operation, maintain ambient airflow. If the airflow is blocked or restricted, or if the intake air is too warm, an over-temperature condition can occur. The command module includes an environmental monitor that will indicate if the system should be shut down to protect the system components.

3.4.4.5.4. After installation, make sure the site maintains an ambient temperature of -10 to 40 deg C (14 to 104deg F). It is essential to keep the area around the PowerTrac System as free from dust and foreign conductive material (for example metal flakes from nearby construction activity) as possible.

3.4.4.5.5. Multiple patch panels can be rack-mounted with no clearance between them. However, when mounting any of the PowerTrac components in a rack with other equipment ensure that the intake and exhaust vents are free from obstruction and that exhaust from other equipment does not blow into the intake vents of the panel, power supply chassis and command module.

3.4.4.5.6. For the panel, cooling air is exhausted through the underside of the "chin" and drawn into the front side of the "chin". Keep the front of the panel clear of obstructions, including dust and foreign conductive material, and away from the exhaust ports of other equipment.

3.4.4.5.7. To maintain normal operation and ensure high system availability, maintain the ambient temperature within the specified range, and assure EMI-free and continuous power. The environmental ranges listed in the specifications section of this document are those within which the panel will continue to operate; however, a measurement that approaches the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental anomalies before they exceed the maximum operating range.

3.4.4.6. Pre-Installation Requirements

3.4.4.6.1. Prepare to connect the appropriate number of power supply chassis to separate, dedicated circuits; refer to specifications section for power input requirements of each Chassis under different load conditions.

3.4.4.6.2. Provide direct grounding to the branch circuits.

3.4.4.7. EMI Recommendations

3.4.4.7.1. This device complies with part 15, class A of the FCC rules. Operation of this device is subject to the following two conditions; (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation."

3.4.4.7.2. When wires are run for any significant distance in an electromagnetic field, radio frequency interference (RFI) can occur between the field and the signals on the wires.

3.4.4.7.3. Improper, damaged or poorly installed plant wiring can result in radio frequency interference.

3.4.4.7.4. Strong EMI, especially when caused by lightning or radio transmitters, can damage or destroy internal power, asset or communication components of the PowerTrac system.

3.4.4.8. Electro-static Discharge

3.4.4.8.1. Discharge Horizontal cable before connecting to the PowerTrac Panel.

3.4.4.8.2. Always use an ESD-preventive wrist or ankle strap, and ensure that it makes maximum contact with the skin.

3.4.4.8.3. When coming into contact with any internal components, always use a wrist strap connected an approved grounding source.

3.4.4.8.4. The wrist strap protects only the card from ESD voltages on the body; ESD voltages on clothing can still cause damage.

3.4.4.9. Power Requirements and Heat Dissipation

3.4.4.9.1. Calculating power requirements is useful for planning the power distribution system needed to support the PowerTrac system. Heat dissipation is an important consideration for sizing the air-conditioning requirements for an installation. Refer to Specifications for the power and heat ratings. Under maximum load conditions a fully loaded PowerTrac chassis powering two PowerTrac panels.

3.4.4.9.2. To prevent a loss of input power, be sure the total maximum load on each AC circuit is within the current ratings of the branch circuit wiring and breakers. A fully loaded chassis powering two panels at maximum load - 100V @ 12A - 240V @ 6.0A

3.4.4.9.3. We recommend the use of a Twist-Lock electrical connector to eliminate the use of a dedicated circuit to be used incorrectly.

3.4.4.10. Grounding Requirements

3.4.4.10.1. For proper grounding installation use copper connectors only and bond to ground per local building and fire code regulations. Attach the provided two hole ground lug to the chassis using 1/4-20 nuts to the appropriate ground system with number 6 AWG wire. The grounding connector is on the AC input side of the chassis.

3.4.4.11. Rack Mounting

3.4.4.11.1. PowerTrac system components are meant to be rack-mounted, and are not intended to bear more than their own weight when mounted. Do not use the mounted components as shelves.

3.4.4.11.2. A standard rack-mount kit is included with each panel, power supply chassis, and command module for mounting in a standard 19-inch (48.3 cm) equipment rack (per EIA 310-D).

3.4.4.11.3. The equipment rack is the proper size. The width of the rack, between the two front mounting strips or rails, must be 17.75 inches (45.09 cm).

3.4.4.11.4. The rack must have sufficient vertical clearance to insert each component.

3.4.4.11.5. The equipment rack is stable and in no danger of falling over. Verify that the rack is properly mounted and supported for the intended use. The rack is required to be bolted to the floor.

3.4.4.11.6. Install heavier equipment in the lower half of the rack to maintain a low center of gravity and prevent the rack from becoming top-heavy and tipping over.

3.4.4.11.7. Install the stabilizers before mounting or servicing the PowerTrac system components in the rack (if the rack is provided with stabilizing devices).

3.4.4.11.8. The equipment rack is properly ventilated. Install the PowerTrac system in an enclosed rack only if it has adequate ventilation or an exhaust fan; use an open rack whenever possible.

3.4.4.11.9. Ensure that the ambient temperature of the rack environment does not exceed a maximum temperature of 104°F (40°C). Note that if the PowerTrac Power chassis is installed in a closed or multiunit rack assembly, the ambient operating temperature of the rack environment might be higher than the ambient room temperature. Realized a ventilation system in a closed rack that is too powerful might also prevent cooling by creating negative pressure around the system and redirecting the air away from the intake vent.

3.4.4.11.10. Note that other (non PowerTrac) equipment near the bottom of a rack may generate excessive heat that is drawn upward and into the intake ports of PowerTrac system components above, leading to over-temperature conditions at or near the top of the rack.

3.4.4.11.11. Consider the equipment and cabling that is already installed in the rack. Ensure that cables from other equipment will not obstruct the airflow or impair access to the power supplies or switching modules. Route cables away from field-replaceable components to avoid disconnecting cables unnecessarily for equipment maintenance or upgrades.

3.4.4.11.12. Allow at least 3 to 4 feet (91.4 to 121.9 cm) of clearance behind the rack for maintenance and removal of PowerTrac and cabling system components.

3.4.4.11.13. Properly mount the PowerTrac panels into the designated rack, cabinet, or bracket locations with the #12-24 screws provided.

3.4.4.11.14. Bond the panel to ground, according to manufacturer’s instructions, using the grounding cord provided. This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

3.4.4.11.15. Terminate cables into the back of the panel according to manufacturer’s instructions.

3.4.4.11.16. To maximize transmission performance, maintain wiring pair twists as close as possible to the point of termination. The length of wiring pair un-twist in each termination shall be less than 0.5 inches (13 mm).

3.4.4.11.17. Horizontal or backbone cables extending from the panel terminations shall maintain a minimum bend radius of at least 4 times the cable diameter. Cable terminations shall have no tensile or bending strain on panel IDC contacts in each installed location.

3.4.4.11.18. Install the power supply chassis below the PowerTrac panel using the hardware provided. Bond the power supply chassis to ground using the grounding cord provided.

3.4.4.11.19. Turn off all power supplies before connecting any horizontal cables to the PowerTrac power panel. Turn off all power supplies and unplug all power cords before installing or removing a power chassis. Do not connect the AC power cord until the panel and power chassis are properly bonded to an approved ground according to manufacturer's instructions. Do not connect the AC power cord until the power cord is connected to the panel, and all rocker switches on the power supply modules are in the "OFF" position. In cases where rocker switches are not accessible, the AC power supply cord shall remain accessible to serve as the disconnect means. The 48 V [DTXPM350] and 5V [DTXPM60] power module rocker switches should remain accessible at all times as they serve as the primary disconnection devices.

3.4.4.12. Rack Mounting The PowerTrac Patch Panel

3.4.4.12.1. Follow these steps to install the system in a rack. All practices should comply with current practices as defined in TIA 568-B and related TIA standards.

3.4.4.12.2. Carefully layout system components on the floor, away from foot traffic or on a sturdy table as close as possible to the rack. Leave enough clearance to allow you to move around.

3.4.4.12.3. Use a tape measure to measure the width of the rack. Measure the space between the inner edges of the left front and right front mounting posts to ensure that it is 17.75 inches (45.09 cm) wide. (The chassis is 17.5 inches [44 cm] wide and must fit between the mounting posts.)

3.4.4.12.4. The Power supply chassis can be assembled to the rear flanges of the rack directly behind the PowerTrac Patch panel, directly above or below each PowerTrac Patch panel or at the bottom of the rack as desired.

3.4.4.12.5. In many applications vertical power strips will be mounted to the vertical upright of the rack. If you plan to have a vertical power strip in your application, consider the position of the strip to avoid interference.

3.4.4.12.6. Install patch panel to 19" mounting rails and terminate Category 6 UTP cable per standard termination practices.

3.4.4.12.7. Do not install Power Supply Chassis (Hubbell catalog no. DTXPS) or Command Module (Hubbell catalog no. DTXCM) at this time. However,

when laying out and configuring rack, allow 1U space for Command Module and each Power Supply Chassis to be installed once cable has been pulled and termination and testing have been completed.

3.4.4.12.8. Test

3.4.4.12.8.1. Once cable has been pulled and termination completed, test each link or channel to the Category 6 limits as you would with a traditional panel.

3.4.4.12.8.2. The PowerTrac Patch Panel should be tested for transmission performance prior to powering up the PowerTrac system. Under some conditions, Field Test units have been known to behave in a manner similar to a Power Device, which causes the 48V power to be activated.

3.4.4.12.8.3. The activation of power affects the test circuit of the tester and may result in invalid test results.

3.4.4.12.8.4. Normally, the first test your tester will perform is the wire map test. This test is performed using a DC signal. Because of the unique technology of the PowerTrac panel, a wiremap test performed with a DC signal will report that the panel will not be terminated. Testers that perform the wiremap test with an AC signal will generate a standard wiremap test report. The PowerTrac panel does not affect any other test.

3.4.4.12.8.5. For the latest information, test files and guidance on Field Testing the PowerTrac system, refer to www.hubbell-premise.com.

3.4.4.13. Rack Mounting the Power Supply Chassis

3.4.4.13.1. This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

3.4.4.13.2. Hazardous energy may be present on DC output terminals of the power supply chassis. When the job site is ready for the installation of the active equipment, install Power Supply Chassis' (Hubbell catalog no. DTXPS). Start by installing the unit to the rack uprights in the desired position.

3.4.4.13.3. Connect the grey DC power cables from the rear of the Power Supply Chassis to the appropriate panel. Do not connect the power supply chassis to the power source at this time.

3.4.4.13.4. Ensure that the power, grounding and cooling requirements of the site planning guide have been met. Ensure that the ON/OFF rocker switches on each power supply module is in the off position. See "Figure 4 PowerTrac Power Supply Chassis - Front View".

3.4.4.13.5. Insert 48VDC power supply modules in the appropriate slot in the Power Supply Chassis as required for your application.

3.4.4.13.6. Verify proper installation in accordance with this manual before connection to the AC power source.

3.4.4.13.7. Connect the AC power cords to the power supply

3.4.4.13.8. Turn Power Supply Modules on starting with 48V modules first, and then the 5V module.

3.4.4.13.9. Confirm that Power Status LEDs on each Patch Panel corresponding to the Power Modules are ON.

3.4.4.13.10. Attach PoE Devices. Your standard 802.3af devices should receive power from the Panel at this point.

3.4.5. FACE PLATES, SINGLE GANG, ANGLED

3.4.5.1. Horizontal cabling of the proper category shall be fully deployed from the TR or TE to each outlet location according to applicable codes and standards.

3.4.5.2. Cable slack, service coil, bend radii, and pathway fill ratio shall comply with applicable codes and standards.

3.4.5.3. Outlet boxes shall be secured to a structural member with appropriate fasteners. Using adhesives, Velcro, or tape for fastening outlet boxes is prohibited.

3.4.5.4. Cable ends for termination shall be clean and free from crush marks, abrasions, cuts, or kinks left from pulling operations. Cables at each outlet location shall be terminated with jacks or connectors according to manufacturer’s instructions.

3.4.5.5. Install jacks and connector snap-fit modules into faceplate according to contract drawings.

3.4.5.6. Mount loaded faceplate carefully to the outlet box or ring using the #6-32 screw(s) provided.

3.4.5.7. Avoid kinking, crushing, or over-bending cables in the outlet when mounting loaded faceplates.

3.4.5.8. Cable terminations shall have no tensile or bending strain on IDC contacts or fiber connectors after assembly of faceplate to the wall outlet box.

3.4.5.9. Label each port on the cover plate according to ANSI/TIA/EIA-606-A standard.

3.4.5.10. All unused ports or plate openings shall be filled with blank inserts.

3.4.5.11. Install dust caps on exposed jacks or connectors where applicable.

3.4.6. SURFACE MOUNT BOXES

3.4.6.1. Follow manufacturer’s instructions. For wall mounting, fastening to studs is recommended, but not required.

3.4.6.2. Lay out mounting holes onto the desired wall location. For wallboard, concrete or cinder block walls, drill to the proper depth and install anchors.

3.4.6.3. Installing mounting screws directly into wallboard without using anchors can cause screw pullout and detachment of the surface box.

3.4.6.4. Mount base plate of surface box to outlet location using fasteners or double-sided foam tape provided. Note: furniture and wall outlet applications require mounting of base plate prior to cable pulling and connector termination.

3.4.6.5. Install cover onto base plate.

3.4.6.6. Using proper method, pull cables into entry location. Note: if raceway entry is not used, pull cables through base plate opening.

3.4.6.7. Installed cable slack, service coil, bend radius, and pathway fill ratio shall comply with applicable codes and standards.

3.4.6.8. Cable ends for termination shall be clean and free from crush marks, abrasions, cuts, or kinks left from pulling operations.

3.4.6.9. Final dressing of copper and fiber cables is performed during connector termination.

3.4.6.10. Remove cover and terminate jacks and connectors according to manufacturer's instructions.

3.4.6.11. Install terminated jacks and connector snap-fittings into mounted base plate according to contract drawings.

3.4.6.12. Horizontal cables extending from mounted jacks shall maintain a minimum bend radius of at least 4 times the cable diameter.

3.4.6.13. Horizontal buffered fiber cables extending from mounted fiber connectors shall maintain a minimum bend radius of at least 1 inch.

3.4.6.14. Cable terminations shall have no tensile or bending strain on IDC contacts or fiber connectors after assembly of cover to base plate.

3.4.6.15. Label each port on the surface box according to ANSI/TIA/EIA-606-A standard.

3.4.6.16. All unused ports shall be filled with blank inserts.

3.4.6.17. Install dust caps on exposed jacks or connectors where applicable.

3.4.6.18. Workstation cords connected to surface box outlets shall be identified for length, and shall not exceed horizontal channel length limits when installed.

3.4.7. PATCH CORDS

3.4.7.1. Remove patch cords from bags and apply channel or port identification labels per specification.

3.4.7.2. Patch cord lengths should match the distance between connection points, with enough slack for cable management and bend radius control.

3.4.7.3. For cross-connect panels in the ER or TR, place the patch cords properly into the installed front cable organizer. Plug each end into the respective panel and equipment ports. Push the plug into the receptacle until the latch clicks into position. Installed patch cords should be neat, with no kinks, tangles, or tight bends.

3.4.7.4. To connect workstation equipment to the outlet, route the patch cord behind furniture and plug into the network port. Patch cords should not interfere with the operator space or electrical cords. Note: workstation cords are normally installed after placement of office furniture.

3.4.8. FIBER OPTIC CONNECTOR

3.4.8.1. Remove connector from its package. Verify that the termination clip is correctly mounted on the connector by firmly squeezing the top and bottom of the clip until a "click" is heard.

3.4.8.2. The connector boot comes with a 900mm clear over tube already assembled onto it remove the clear over tube from the boot and insert the 900mm fiber directly into to back of the boot.

3.4.8.3. Make a mark for the amount of coating/buffer to be removed at approximately 15mm from the end of the fiber. Using a strip tool, remove the coating/buffer in small increments to the specified length. Be careful not to damage glass fiber. Inspect the strip tool before using and make sure that all bits of buffer or coating are cleaned from the tool before stripping.

3.4.8.4. Clean the exposed fiber with a wipe saturated in reagent grade alcohol. While cleaning, bend fiber slightly to check for nicks. Fiber will break easily if nicked.

3.4.8.5. Use approved cleave tool for appropriate fiber applications.

3.4.8.6. With your thumb on the clamp handle, open the cleave tool and insert the fiber into the fiber guide. For 900mm buffer, align the edge of the 900mm buffer with the 13mm mark on the fiber guide. Close the cleave tool on the fiber by gently releasing your thumb. Slowly press down on the top of the cleave tool (cleaver arm) to cleave the fiber. Do not apply excess pressure; the cleaver arm only needs to touch the fibers lightly to score them.

3.4.8.7. Slowly release the cleaver arm. Gently bend the fiber guide downward to break fibers at the score mark. Discard broken fibers.

3.4.8.8. For the 900mm buffered fiber, mark the buffer 7mm back from the buffer edge for LC connectors and 11mm back from the buffer edge

3.4.8.9. Grip the buffer or coating approximately 10mm behind the mark from the previous step and insert fiber slowly into the back of the connector. Be sure to be holding the connector wedge along the correct sides to facilitate assembly. The fiber is fully inserted when the mark on the buffer or coating disappears into the back of the connector. Caution: Gripping the fiber too close to the back of the connector may cause the fiber to break inside the connector.

3.4.8.10. Re-grip the buffer about 40mm from the back of the connector after the mark on the buffer has disappeared into the back of the connector. Apply a small amount of force until the coating/buffer fiber starts to bow out from the back of the connector.

3.4.8.11. While maintaining a slight bow on the coated/buffered fiber, squeeze the termination clip to release the wedges from the connector body. An audible "click" will be heard.

3.4.8.12. Slide out the bottom piece of the termination clip in the direction indicated by the arrow located on the bottom of the termination clip. Remove the termination clip from the connector body.

3.4.8.13. Slide the strain relief boot up into place over the back of the connector.

3.4.8.14. Make sure the dust cover remains on until time for termination.

3.4.8.15. Do NOT dangle the connector from the enclosure.

3.4.9. FIBER OPTIC RACK MOUNT ENCLOSURE

3.4.9.1. Follow manufacturer's instructions. Remove FCR enclosure/FTR tray from package and position onto the rack mounting rails in the location specified in the contract documents.

3.4.9.2. With the #12-24 screws provided, fasten the FCR enclosure in place on the rack mounting rails.

3.4.9.3. Install the FSP adapter panels as specified in the contract documents. Unused spaces will be covered with blank adapter panels.

3.4.9.4. Replace covers on the FCR enclosure, slide the inner tray to the closed position and shut the quick-release latches. Re-install the front door and shut the latches.

3.4.9.5. Final dressing of fiber cable is performed during cable termination.

3.4.9.6. Punch out the desired knockouts for cable entry.

3.4.9.7. Using proper method, pull cables into cabinet through the desired knockout entry location.

3.4.9.8. Strip the outer sheath and sub sheaths of the fiber cable to provide at least (2) meters service loop of the individual buffered fiber strands.

3.4.9.9. Anchor the outer cable sheath into the rear channel of the inner tray using the cable ties provided. Note: in FCR-series enclosures, leave enough slack in the main cable to allow free motion of the inner tray fully outward. Remove cable entry knockouts as required.

3.4.9.10. Installed copper and fiber cabling shall be properly strain relieved. Cable service coil, bend radius, and pathway fill ratio shall comply with applicable codes and standards.

3.4.9.11. Use the plastic adhesive-backed clips provided to form the fiber strands into a large service coil on the surface of the inner tray. For FCR-series enclosures, be sure the inner tray has full mobility in and out, with no cable kinks or snags.

3.4.9.12. Close inner tray and front cover, and lock the quick-release fasteners.

3.4.9.13. Final dressing of fiber cable is performed during cable termination.

3.4.9.14. Backbone Cable: Use 12 strand, 50/125 LO MM Fiber between the existing Telecommunications Closet and the new Telecommunications Room in the addition.

3.5. GROUNDING

3.5.1. Comply with TIA/EIA-J-STD- 607.

3.5.2. Grounding Points:

3.5.2.1. Locate grounding terminals in each equipment room, wiring closet, rack and cabinet.

3.5.2.2. Telecommunications Grounding Bus bars: Mount on wall of telecommunications entrance facility, equipment room, and closet, with standoff insulators.

3.5.3. BONDING CONDUCTORS:

3.5.3.1. Extend from telecommunications entrance facility to electrical entrance facility and connect to grounding electrode.

3.5.3.2. Where a panel board for telecommunications is located in same room or space as a grounding bus bar, bond to equipment ground bus of electrical panel board.

3.5.3.3. Extend from telecommunications entrance facility to grounding bus bars.

3.5.3.4. Extend from grounding bus bars to ground terminals in equipment racks and cabinets.

3.5.3.5. Extend from grounding bus bars to building metal frame within room, or to metal frame external to room but readily accessible.

3.5.3.6. Bonding conductors shall be insulated copper, No. 6 AWG minimum.

3.5.3.7. Bonding conductors shall be installed without splices unless approved by Architect because of special circumstances. Where splices are necessary, they shall be accessible and shall be located in telecommunications spaces. Splices shall be by irreversible compression connectors or by exothermic welding.

3.6. IDENTIFICATION

3.6.1. All labels and administration shall comply with TIA/EIA-606-A

3.6.2. Color-code cross-connect fields Apply colors to voice and data service backboards, connections, covers, and labels.

3.6.3. Use logical and systematic designations for facility's architectural arrangement and nomenclature, and a consistent color-coded identification of individual conductors.

3.6.4. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

3.6.5. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet

3.6.6. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

3.6.7. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.

3.6.8. Label each unit and field within distribution racks and frames.

3.6.9. Within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

3.6.10. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations Protect with rigid frame and clear plastic cover Furnish an electronic copy of final comprehensive schedules for Project.

3.6.11. Cabling Administration Drawings: Show building floor plans with cable administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

3.7. FIELD QUALITY CONTROL

3.7.1. Perform field tests and inspections according to TIA/EIA-568-B.1 and prepare test reports.

3.7.2. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

3.7.3. Retest and inspect cabling to determine compliance of replaced or additional work with specified requirements.

3.7.4. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

3.7.5. Retain first paragraph below to require Contractor to perform tests and inspections.

3.7.6. Perform tests and inspections.

3.7.7. Tests and Inspections:

3.7.7.1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.

3.7.7.2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.

3.7.7.3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

3.7.8. Copper Cable Tests:

3.7.8.1. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

3.7.8.2. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords

and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

3.7.8.3. After installation and termination of the Category 6 UTP cable, test each cable in accordance with TIA/EIA TSB 67. Test each cable from both ends with the scope to verify compliance with TIA/EIA specifications. Test the cables at a full range of frequencies, indicated by TIA/EIA.

3.7.8.4. Each cable tested using the appropriate tester shall have a full page printout. Each page shall include the NEXT and ACR results for each pair combination from both ends of each cable. Each page shall indicate the name of the operator who performed the test and the date of the test. Also, each page shall have the identification of the cable: building, room, and outlet number.

3.7.8.5. If any of the test results do not meet the criteria specified by TIA/EIA, then the contractor shall notify the owner representative.

3.7.8.6. An introductory discussion documenting test instruments used, qualifications of operators, test conditions, setup parameters, any other pertinent information, and all test results are to be placed in a 3 ring binder. This manual shall be organized in a neat and clear fashion.

3.7.8.7. Each cable tested is to be recorded in a log with the cable number, date, and the initials of the technician who tested the cable. A mark shall be made on each connector tested, this mark shall either be removed or not visible to the customer at the completion of the project. These tests shall be inserted into the manual under a separate section from the Category 5e results.

3.7.8.8. The contractor’s RCDD is responsible for all cable and testing procedures. The RCDD shall provide a letter with the complete test results certifying that all

cables have been tested with the proper equipment and meet the Category 5e and Category 6 UTP specifications as defined by TIA/EIA. Record all test conditions and setup parameters and include them with the test documentation.

3.7.9. Optical Fiber Cable Tests:

3.7.9.1. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

3.7.9.2. Link End-to-End Attenuation Tests:

3.7.9.2.1. Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.

3.7.9.2.2. Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

3.7.9.3. UTP Performance Tests:

3.7.9.3.1. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:

3.7.9.3.1.1. Wire map.

3.7.9.3.1.2. Length (physical vs. electrical, and length requirements).

3.7.9.3.1.3. Insertion loss.

3.7.9.3.1.4. Near-end crosstalk (NEXT) loss.

3.7.9.3.1.5. Power sum near-end crosstalk (PSNEXT) loss.

3.7.9.3.1.6. Equal-level far-end crosstalk (ELFEXT).

3.7.9.3.1.7. Power sum equal-level far-end crosstalk (PSELFEXT).

3.7.9.3.1.8. Return loss.

3.7.9.3.1.9. Propagation delay.

3.7.9.3.1.10. Delay skew.

3.7.9.3.2. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.3.

3.7.9.3.2.1. Fiber optic cable shall be tested with a Optical Time Domain Reflectometer (OTDR) or an approved equal. The OTDR shall have a 3.5 inch disk drive for storing test results. These results shall be copied onto a compact disk (CD) and shall be included in the complete test results manual. Record all test conditions and

setup parameters used and include them with the test documentation.

3.7.9.3.2.2. Software shall be provided to the owner in order to view the OTDR traces. Provide the latest version that is fully licensed and in the original packaging with documentation.

3.7.9.3.2.3. Clean all fiber optic cable connectors, sleeves and test cords prior to testing. Follow the recommendations of the test instrument manufacturer for cable and installation preparation.

3.7.9.3.2.4. The contractor shall test all fiber patch cords prior to the installation.

3.7.9.3.2.5. At least one strand per reel of fiber optic cable shall be tested prior to installation with the OTDR. This will verify the

continuity of the fiber cable on the reel. A printout of this test shall be made for future reference.

3.7.9.3.2.6. After installation and termination of the fiber optic cable, test each strand of fiber to verify that it meets performance requirements. Each strand shall be tested at both 850nm and 1300nm wavelengths. All tests are to be done with a known length of launch cable (100' recommended) preceding the installed fiber. Provide a full page printout and a software copy of each strand at each of these wavelengths. Each strand should be properly identified using the nomenclature as specified on the drawings. Each page shall include the name of the operator who performed the test and the date of the test.

3.7.9.3.2.7. If any of the test results do not meet the criteria specified by TIA/EIA, then the Contractor shall notify the Owner's representative.

3.7.9.3.3. Final Verification Tests: Perform verification tests for UTP and optical fiber systems after the complete communications cabling and workstation outlet/connectors are installed.

3.7.9.3.3.1. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.

3.7.9.3.3.2. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

3.7.9.3.3.3. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

3.7.9.3.3.4. End-to-end cabling will be considered defective if it does not pass tests and inspections.

3.7.9.3.3.5. Prepare test and inspection reports.

3.8. FIRESTOPPING

3.8.1. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems."

3.8.2. Comply with TIA/EIA-569-A, Annex A, "Firestopping."

3.8.3. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.9. IDENTIFICATION

3.9.1. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."

3.9.1.1. Administration Class: 2

3.9.1.2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

3.9.2. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.

3.9.3. Comply with requirements in Division 9 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

3.9.4. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration.

3.9.5. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

3.9.6. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

3.9.7. Cable and Wire Identification:

3.9.7.1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

3.9.7.2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.

3.9.7.3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).

3.9.8. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

3.9.8.1. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.

3.9.8.2. Label each unit and field within distribution racks and frames.

3.9.9. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

3.9.10. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.

3.9.10.1. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.

3.9.11. Cables use flexible vinyl or polyester that flex as cables are bent.

END OF SECTION 17000

SECTION 274100 - AUDIO – VISUAL SYSTEMS

PART 1 GENERAL

1. RELATED SECTIONS

(A) The Drawings, General, Special and Supplementary Conditions of the Contract to the Work of this Section.

(B) All project construction documents correspond to this Section.

(C) The Specification Sections of other disciplines correspond to this Section, insofar as contractor coordination and the requirements for interconnection with the work of other contractors are required, and insofar as they apply.

(D) Division 16000 – Electrical Systems

2. SYSTEM DESCRIPTION

(A) Audio Reinforcement System consists of loudspeakers, digital audio processing platform, equipment cabinet, cabling, rigging materials, and cabling.

(B) The video & control system consists of a projector, screen, controller, touch panels, plates, and patch panels. Conduit and power provided by the Electrical contractor.

(C) Integration of any owner furnished equipment (OFE), furnishing and installation of specified products, as well as incidental equipment, hardware and cabling required providing complete and fully functional systems. Furnish, deliver, erect, and connect all the material and equipment described herein and, in the drawings, and all other incidental material and tools, transportation, etc. required to make work complete, in accordance with these plans and specifications, as required to leave the system in first class operating condition, excluding those items designated WORK BY OTHERS (WBO) or NOT IN CONTRACT (NIC).

(D) Verify dimensions and conditions at the job site prior to installation, and perform installation in accordance with these specifications, manufacturers' recommendations and all applicable code requirements.

(E) The AV systems include the following major items:

a) Digital audio signal processors, digital control processor and touch panel.
b) Loudspeakers and loudspeaker mounting or support hardware
c) Projector, screen, AV switcher, controller, touch panels, cabling and plates.
d) Equipment Racks, Control Consoles, and accessories
e) Cables, Connectors, Plates, and Wiring
f) Preparation of submittal information
g) Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements
h) Specific control system programming, training & support
i) Initial tests and adjustments, demonstration for approval, final adjustments and documentation

j) Instruction of operating personnel; provision of manuals

k) Maintenance services; warranty

(F) Provision of system testing, system documentation and instruction of Owner Personnel.

(G) Guarantees and Warranties.

3. REFERENCES

In addition to the references in Division 1, all requirements of the latest published edition, un- less otherwise noted, including but not limited to the following, shall apply. In the event of conflict between cited or referenced standards, the more stringent shall govern.

a) National Electric Code (N.E.C).

b) Federal Communications Commission (F.C.C.) Rules and Regulations, Part 76.

c) Society of Cable Television Engineers (S.C.T.E.)

d) Society of Motion Picture and Television Engineers (S M P.T.E.)

e) American Society for Testing Materials (A.S.T.M.)

f) National Cable Television Association (N.C. T. A.)

g) Electronic Industries Association (E.l.A)

h) Telecommunications Industries Association (T.I.A.)

i) "Handbook for Riggers", 1977 Revised Edition, Newberry, W. G., Calgary, Alberta Canada.

j) "Basic Principles for Suspended Loudspeaker Systems", Technical Notes Volume 1, Number 14, JBL Professional.

k) Davis, Don and Carolyn, Audio system Engineering, Second Edition, Howard W. Sams and Co., Indianapolis, Indiana, 1986.

l) DOE Standard DOE-STD-1090-99 Hoisting and Rigging

m) Auburn University 2021 Design Standards

4. SUBMITTALS

(A) Provide shop drawings and record drawings using the following scales:

a) Details – not less than 1/4"=1'-0"

b) Plans – not less than 1/8"=1'-0"

(B) Mark all submittal documents to show the project name, date, Architect, Contractor, Sub-Con- tractor, and this specification Section number.

(C) Make each specified submittal as a coordinated package complete with all information. Un-coordinated sets will be returned without review.

(D) Cable and Connector Submittal: Submit sample cable with connections and wire labels. Cable sample should be 18" in length. Submit cable/connector assemblies for each type of cable to be used on the project. Manufacturer's cable jacket ID lettering must be included on the sample cable.

(E) Product Data: Submit manufacturer's product data sheets for each item of equipment that will be provided as part of this contract. Provide a complete list of proposed equipment broken down by the system. Provide a budget summary page listing price by system. Binders shall be 3-ring binders sized to handle materials plus 34% excess. All cut sheets shall be arranged by system type and then by specification number with tabbed dividers between sections. A table of contents shall appear at the front of the binder.

(F) Submit heat load calculations showing how loads were derived if requested by Owner or Owners Representative.

(G) Custom Software Programming including Graphical User Interface (as required). Provide for approval at least three (3) weeks prior to system commissioning, electronic copies of all custom software. It is the Contractor's responsibility for all custom software programming for the systems they are controlling. Coordination with the Consultant is required for the development of this software.

(H) Provide Panel Fabrication Details including panel engraving schedule to Owner and Consultant prior to ordering panels.

(I) Any technical questions in regard to the proposal/systems shall be submitted in written form to the AV Consultants:

Walthall & Associates, Inc.
200 Swift Creek Drive; Suite
G Cantonment, FL 32533
Electronic mail:
chuck@walthall.us Telephone
(850) 478-9002

5. QUALIFICATIONS

(A) Bidder shall be an A/V systems contractor, normally engaged in the full-time business of A/V systems installation. Show proof that the bidder has been in the communications system installation business for a period of no less than five years and has completed projects of similar size and scope. The Owner and/or Owner's representative reserves the right to reject any bids submitted by firms without sufficient experience in projects of this size, complexity, or any other terms the owner or owner's representative may deem relevant.

(B) No sub-contractor or contract employees will be permitted to perform the contractor's responsibilities as defined herein, unless specifically identified in the bid submission and approved by the Owner and/or Owner's representative. The contractor shall have sole responsibility for the satisfactory execution of the work, even though he may have sub-contracted a portion of the work, or had certain manufacturers install their own products.

(C) The Contractor shall provide resumes of the project coordinator (manager) and lead installer planned to be used for this project. This shall be presented at the presentation of proposal. The Contractor shall maintain the same project manager and lead installer throughout the course entire course of the project. If a personnel change is required, the Contractor shall notify the Owner and/or Owner's representative and the General Contractor 30 calendar days prior to the change.

6. QUALITY ASSURANCE

(A) Review architectural, civil, structural, mechanical, electrical, and other project documents relative to this work.

(B) Verify all dimensions on the site.

(C) Coordinate the specified work with all other trades.

(D) Provide all items not indicated on the drawings or mentioned in the specifications that are necessary, required or appropriate for this work to realize complete, stable and safe operation.

(E) Review project documentation and continuously make known any conflicts discovered and provide all items necessary to complete this work to the satisfaction of the Owner and/or Owner's representative without additional expense. In all cases where a device or item or equipment is referred to in singular number or without quantity, each such reference shall apply to as many such devices or items as are required to complete the work.

(F) Provide additional support or positioning members as required for the proper installation and operation of equipment, materials and devices provided as part of this work as approved by the Owner and/or Owner's representative, without additional expense.

(G)Regularly examine all construction, and the work of others, which may affect the work to ensure proper conditions for the equipment and devices before their manufacture, fabrication or installation. Contractor shall be responsible for the proper fitting of the systems, equipment, materials, and devices provided as part of this work.

(H) Promptly notify the Owner and/or Owner's representative of any difficulties that may prevent proper coordination or timely completion of this work. Failure to do so shall constitute acceptance of construction as suitable in all ways to receive this work, except for defects that may develop in the work of others after its execution.

(I) The Systems Contractor shall maintain the same Project Coordinator (Manager) and Field Supervisor throughout the entire project. The Systems Contractor shall provide contact information to the client, AV Consultant, General Contractor and Electrical Contractor, for both parties prior to commencing on-site project work.

(J) Source Limitations: Obtain as many products as possible from a single manufacturer. Obtain each item as a completely newly manufactured unit, including necessary mounting hardware, manuals and accessories.

7. OWNER'S RIGHT TO USE EQUIPMENT

(A) The Owner reserves the right to use equipment, material and services provided as part of this work prior to final acceptance without incurring any obligation to:

a) Accept material and equipment or completed systems until all punch list work is completed and all systems are acceptable.

b) Pay additional cost or charge.

c) Commence the warranty period for any system or device provided as part of the work.

8. PERMITS AND INSPECTIONS

(A) Obtain all required permits and inspections.

(B) Furnish material and workmanship for this work in conformance with all code requirements

(C) Perform all tests required herein, or as may be reasonably required to demonstrate conformance with the specifications.

9. DELIVERY, STORAGE, AND HANDLING

(A) Store equipment and materials safely and securely inside at the job site in a manner that will

not interfere with the work of other trades.

(B) Replace all damaged or defective work or material at no additional cost, prior to acceptance.

(C) Check, and if necessary, clean all systems, equipment, devices and components included in the work after acceptance and completion of the work of all other trades.

(D) Store materials in designated areas.

(E) Provide and maintain suitable barriers, guards, fences and signs wherever necessary for the safety of others relative to and/ or for the protection of this work.

(F) Protect all materials and equipment to prevent the entry or adhesion of concrete, plaster, unintended paint, or other damaging debris or materials.

10. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

(A) Submit shop drawings, product data and samples together in one package within thirty (30) days after award of the Contract and prior to ordering equipment.

(B) Submit catalog data sheets, neatly bound with title page, space for submittal stamps, and tabbed dividers between Sections. Provide a complete list of proposed equipment. Provide a summary of pricing broken down by system. Denote all substitutions.

(C) Submit rack layouts indicating the proposed arrangement of mounted equipment including junction boxes and locations of conduit penetrations.

(D) Submit construction details of all custom fabricated items and approved equipment modifications. Include complete parts lists, schematic diagrams, and all dimensions required for proper assembly.

(E) Submit finish schedule indicating proposed color selections and finishes for custom fabricated items, wall plates and custom labels.

(F) Submit mounting and support details for all items mounted overhead, including loudspeakers complete with parts lists and dimensions. Include a full plan view, front elevation and side elevation of each unique item with corresponding support structure and mounting hardware.

(G) Approval of shop drawings or submittal indicates only the acceptance of the manufacturer and quality. Specific requirements, arrangements, and quantities still must comply with the intent of the contract documents as interpreted by the Owner and/or Owner's representative unless specifically approved in writing.

(H) Submittals, which are incomplete, deviate significantly from the requirements of the Contract Documents, or contain numerous errors, will be returned without review for rework.

11. PROJECT RECORD DRAWINGS (As Built Drawings)

(A) Approved shop drawings, updated to accurately document the final conditions of the system installation. Legibly mark to record actual construction:

a) Field changes of dimension and detail.

b) Changes made by Revision Order, Directive or other modifications.

c) Details not in original contract drawings.

d) Any other miscellaneous items installed under this contract. At a minimum, the ends of each line should have the type of termination, coordinate and elevation indicated.

e) Layouts of system devices showing actual device locations.

f) Results of all Field Quality Control Tests in this Section.

12. OPERATION MANUALS

(A) Operation manuals shall include, but not limited to the following sections:

a) Table of Contents.

b) Typed description of system including key features and operational concepts (e.g. remote-control features, switching functions, and mixing capabilities).

c) Setup diagrams and typed instructions for use in typical situations as directed by the Owner.

d) Small scale plans showing locations and circuit numbers for all system outlets and receptacles.

e) Single-line block diagrams showing all major components of the systems.

f) Manufacturer's operation manuals for user-operated equipment (tape decks, processors, communication equipment, etc.).

13. MAINTENANCE MANUALS

(A) Provide the owner any maintenance manuals that come packaged with equipment.

14. PROJECT CONDITIONS & LOCATIONS

(A) If project conditions indicate a need to vary from the Specifications or Drawings, notify the Owner and/or Owner's representative, make recommendations, and proceed with the necessary changes only after receipt of approval from the Owner and/or Owner's representative.

(B) All accessories provided by equipment manufacturer shall retain the property of the owner. Collect, inventory and present to owner after Acceptance Testing.

15. WARRANTY

(A) Provide a one (1) year System Warranty, and the following, at no additional cost to the Owner.

(B) Warranty shall contain the following:

a) Date, project title and number.

b) Contractor's name, address, telephone number and point of contact.

c) Title and number of each as-built document.

d) Signature of contractor, or its authorized representative.

e) Include the name of a contact person for service or maintenance and define the limits of the system warranty.

(C) During the System Warranty period, answer all service calls and requests for information within twenty-four (24) hours. Repair or replace faulty items and correct faulty workmanship on site within twenty-four (24) hours of all service calls.

(D) Conduct all warranty repairs and service at the job site unless in violation of manufacturer's warranty. In the latter event, provide substitute systems, equipment, and/or devices, acceptance to the Owner, for the duration of such off site repairs. Transport warranty materials, parts, and personnel to and from the job site at no additional cost.

(E) For products with manufacturer's warranties lasting more than one (1) year, register warranties in the Owner's name.

16. SUBSTITUTIONS

(A) Denote any substitutions for consideration by the Owner or Owner's representative.

18. BRAND NAMES AND ACCEPTABLE ALTERNATIVES

(B) The brand name(s) and model number(s) mentioned are used in this specification as a measure of quality and performance. Any brand or manufacture of acceptable or better quality and performance than that specified will be considered for acceptance by the Owner and/or Owner's representative at time of Bid. However, the Owner and/or Owner's representative reserves the right to reject and deny any substitution that it may, in it's sole discretion, deem unequal, and the findings in this regard shall be accepted by the bidder as final and binding.

19. OWNER FURNISHED EQUIPMENT (O.F.E.)

(A) Certain equipment may be identified as Owner Furnished (OFE or Existing). This Owner Furnished Equipment may presently be part of the Owner's system, or will be provided by the Owner, and will be delivered to the contractor's off-site construction facility, delivered to the contractor's on-site secured storage area, or installed on site by others, as appropriate, for incorporation into the system.

(B) Clean and inspect the OFE, and notify the Owner and/or Owner's representative of damage or defect and the extent of repair and/or adjustment required to bring the OFE to original specification. Service OFE only if directed by the Owner and/or Owner's representative under the arrangements of a separate contract.

(C) Connect, terminate and properly incorporate OFE into the proper system for its type. Reconnect any equipment disconnected for installation of new equipment. Verify proper operation and control functions as before removal.

20. INSURANCE

(A) Insure materials against theft, vandalism, damage due to the elements, fire, etc., to their full value. Materials and the flawless condition of materials shall remain the responsibility of the contractor until acceptance of the system by the Owner.

(B) Contractor shall be responsible for having in force the following insurance protection, this protection shall also be required for any subcontractors the Contractor may hire. Certificates of insurance shall be provided within five (5) calendar days upon request.

a) Workers Compensation Coverage for all workers

b) General, Automobile and Excess or Umbrella Liability Coverage

c) General Liability Coverage – Occurrence Form Required

d) Business Automobile Liability Coverage

21. WORK BY OTHERS (WBO, BY OTHERS) NOT IN CONTRACT (NIC)

(A) As noted on drawings and in project documentation

22. BEST VALUE ITEMIZED PROPOSAL

(A) As noted elsewhere, the AV contractor shall furnish items meeting or exceeding the specifications, items which are new and of the latest technology.

(B) Each item or system group of items shall be individually priced with the understanding **OKALOOSA COUNTY SCHOOL DISTRICT** may select any single or any combination of items as required meeting any budget constraints. Where the contractor chooses, an alternate item or system may be proposed in addition to the items specified.

(C) Award will be based on best value to **OKALOOSA COUNTY SCHOOL DISTRICT**, so pro- posers are required to attach literature as required, on each individual component proposed and may include with each a narrative explaining the merits of the component.

(D) In addition to above, the AV contractor shall include a narrative at the beginning of his proposal describing the Project Approach, personal experience and overall relative value to **OKALOOSA COUNTY SCHOOL DISTRICT.** This narrative should not exceed two double- spaced typewritten pages and may include any other points the proposer wishes to include.

PART 2 PRODUCTS

1. GENERAL

(A) All equipment, except OFE, and materials shall be new, latest version at time of bid, and shall conform to applicable UL, CSA, or ANSI provisions. Re-manufactured or "B" stock equipment will not be accepted without prior written consent from the Owner and/or Owner's representative. Evidence of unauthorized re-manufactured, or "B" stock equipment on the project site will be deemed evidence of the contractor's Failure to Perform the Work. Take care during installation to prevent scratches, dents, chips or disfiguration.

(B) Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required.

(C) Asbestos Prohibition: No Asbestos containing materials shall be used under this section. The contractor shall insure that all materials incorporated in the project are Asbestos free unless specifically authorized in writing by the Owner and/or Owner's representative.

(D) All products listed below are listed for sole source information and establishment of the level of quality required by this project. Refer to the project drawings to establish quantities.

(E) Install all rack mounted equipment with black steel 10-32, button head machine screws with plastic cup washers protecting equipment panel. Do not over torque, round out, strip or mar screws.

(F) Provide and install an escutcheon ring around all pipes, poles and mounts that penetrate the ceiling. Color to be determined by owner.

(G) Some rack-mounted equipment may require shaft locks, covers, or removal of knobs; provide and install during Acceptance Testing

(H) Provide plastic permanent approved labels at the front and rear of all rack-mounted power amplification and signal processing equipment. Mount labels on the equipment rack or equipment chassis, and attach in a neat, plumb, and permanent manner. Embossed labels will not be accepted. Label equipment with schematic enumeration reference, and with descriptive information regarding its function or area it is serving. Similarly, provide permanent approved labels at the rear only of equipment mounted in furniture consoles.

(I) All engraving shall be 1/8" block lettering unless noted otherwise. On dark panels or push-buttons, letters shall be white. Letters shall be black on stainless steel, brushed natural aluminum plates or light-colored push buttons.

(J) All accessories provided by equipment manufacturer shall retain the property of the owner. Collect, inventory and present to owner after Acceptance Testing.

(K) Per IEC-268 standard, all XLR connectors not mounted on equipment shall be wired pin 2 hot (high), pin 3 (low), and pin 1 screen (shield).

2. AUDIO SYSTEMS MATERIALS

(A) The materials or description of work in this section is typical for all systems in this section and all following specification sections.

(B) All equipment items required to provide a fully functional system may not be noted or depicted on the schematic diagrams. Confirm your quote includes all required equipment documented in the system drawings and any required equipment not listed or shown. Report any missing or required equipment to the Consultant prior to submitting your quote.

(C) Mounting Hardware exposed to the weather shall be aluminum, brass, and epoxy painted galvanized steel, or stainless steel. Apply corrosion inhibitor to all threaded fittings. AV Contractor can sub the control system programming, training and support from a certified programmar/company.

(D) AUDIO-VISUAL SYSTEM

Reference AV drawings for make, model and quantity of AV components. Notify AV Consultant of any discrepancies prior to submitting bids or shop drawings. Failure to notify does not constitute change order (add) approval.

Verify with system drawings, on-site inspection and requirements to provide a fully functional system(s).

Provide all materials, labor, training and miscellaneous equipment required.

Provide all display mounting devices; wall, ceiling, truss, etc. as required.

Provide projector cage as required in multipurpose & gymnasium spaces.

Provide all industry standard patch bays, fiber trays, patch panels, patch cords and fiber link cables as required.

Provide all required network, audio, video, POE, POE+ and control cables as required.

Provide all digital system programming and GUI control design.

3. CABLES AND CONTROL WIRING

(A) All electrical conductors installed under this contract, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper and shall be Anaconda, Triangle, General or approved equal for power, and Alpha, Belden, or West Penn for low voltage. Cables in plenum rated ceilings outside conduit shall be similar to those listed above, except plenum rated.

(B) Homerun ALL Loudspeaker Cables, Reinforcement Loudspeaker Cables, Monitor and Foldback Loudspeaker Cables. Cables between loudspeakers interconnect junction boxes and racks to be at least No. 12 AWG jacketed pair equal to West Penn CL3 rated product or as shown on the AV drawings.

(C) Other Loudspeaker Cables to be at least No. 16 AWG jacketed pair equal to West Penn CL3 rated product or as shown on the AV drawings.

(D) Line Level and Microphone Level Cables to be at least No. 20 AWG shielded jacketed pair. Fiber shall be single-mode with SC and ST connector terminations. Fiber patch panels and trays shall be Panduit Opticom series or equal.

(E) Coaxial Cable for video and RF transport shall be RG-6 quad-shielded with a solid copper center conductor. Any other cable if installed shall be removed and replaced with approved cable at no additional expense to the owner.

(F) Low Voltage Control Cabling to be at least No.18AWG shielded CL3 rated cable, conductor count to be determined by application.

(G) All cables that are not in conduit and are run through plenum rated spaces shall be plenum rated cable of the gauge and conductor count required for the application.

4. ADD OPTIONS

(A) Provide pricing on the following add option for purchasing consideration by the Owner. En- sure pricing includes all necessary components, parts and labor to provide a fully functional system.

N/A

5. DELETE OPTIONS

(A) Provide pricing on the following delete options for purchasing consideration by the Owner. Ensure pricing includes all necessary components, parts and labor to provide a fully function- al system.

a) DELETE OPTIONS are at Owner's discretion upon receipt of proposal.

6. FABRICATION

(A) Equipment Racks

a) Pre-assemble and test all racks before delivery to the job site, provide a written report on pre-assembly and test results to Owner/Owner's Representative.

b) Verify the depth of each rack prior to assembly to ensure that mounted equipment will fit completely inside with the front and rear door closed.

7. SOURCE QUALITY CONTROL TESTS

(A) Provide test equipment, if needed, meeting the minimum specifications to perform the Source Quality Control Tests and Field Quality Control Tests. Furnish the same test equipment for the performance of Acceptance Testing.

8. MISCELLANEOUS CONNECTORS

(A) Certain connectors not identified in specific paragraphs, or indicated on the drawings, are specified by generic "type". At all times, match connector types used in adjacent project areas, including existing audio, television and audiovisual systems.

PART 3 EXECUTION

1. INSTALLATION

(A) Verify existing conditions before starting work.

(B) Execute all work in accordance with Part 1.3 References in this guideline, and with all local and state codes, ordinances, and regulations.

(C) Install equipment according to manufacturer's recommendations.

(D) Install all rack-mounted equipment with black steel 10-32, button head machine screws,

using plastic cup washers to protect equipment panel.

(E) Rack mounted equipment shall be mounted into racks and fully wired and tested, before delivery to job site. *(Does not apply when racks are existing)*

(F) Install flat black blank panels in all unused rack positions. Use no larger then a two space panel.

(G) Ensure that levels and impedances are properly matched between components.

(H) Choose colors and finishes of all exposed and custom fabricated items and labels to blend in with the surroundings as approved by the Owner and/or Owner's representative.

(I) Firmly and permanently attach electrical boxes, enclosures and permanent equipment to the building. Rigidly mounted equipment and devices shall be level, plumb and square.

a) Set "flush-mounted" units so that the face of the cover, bezel, or escutcheon is in the same plane as the surrounding finished surface.

b) Mount boxes, panels and trim so that there are no gaps, cracks, or obvious lines between the trim and the adjacent finished surface, and ready them to receive final finish, as applicable.

c) Provide access panels where needed to access boxes, panels and enclosures in walls or ceilings, as indicated and dimensioned on the shop drawings.

d) Finish panels to match the surrounding surfaces.

(J) Supports and mounts for equipment to be installed over public areas shall be permanently attached to suitable building structure adequate to support the equipment loads with a safety factor of at least five.

(K) Use attachment hardware with a minimum SAE Grade 5 load rating. Do not use formed eye-bolts or lag screws for support or connection of suspended equipment.

(L) Verify capacity of mounting methods used in the work and associated liabilities. All attachments, attachment points, reinforcement requirements, and hardware selection shall be executed in accordance with the references in PART 1.

2. GROUNDING, SHIELDING AND ISOLATING

(A) Mount and enclose all electrical and electronic equipment in metal enclosures, pedestals or equipment racks.

(B) All junction boxes shall be bonded to the building safety ground.

(C) Use EMT type conduit for all wiring outside of equipment racks except plenum rated wiring above a lay-in ceiling, and outdoor conduits and raceways, where separate insulated ground wiring shall be supplied.

(D) Use flexible conduits and PVC fittings to provide insulated connections of the building electrical raceways to equipment racks. Mount all equipment racks at the job site in a manner that provides electrical isolation from the building structure and electrical raceways.

(E) Electronics racks and cabinets shall be boned to the isolated ground technical power system only. Refer to Section 16770 for coordination and test with the Electrical Contractor.

(F) In the case where a metal equipment cabinet or rack is located on a suspended, concrete or bonded flooring system, the enclosure shall be placed on a Santoprene isolating mat with a minimum thickness of 3/32" and a Durometer of 80A,.

3. WIRING PRACTICES

(A) Where specific instructions are not given, perform all wiring in strict adherence to standard broadcast and sound engineering practices in accordance with the references listed in PART 1.

(B) Group all wiring into the following classifications by power level or signal type:

a) Microphone Level: less than -20 dBm.

b) Line Level Audio and DC Control Circuits: -20 dBm to +30 dBm.

c) Speaker Level: greater than +30 dBm.

d) AC Mains Power Circuits

(C) Separate wiring of differing classifications by at least six (6) inches, wherever possible. Wherever lines of differing classification must come closer together than six (6) inches, cross them perpendicular to each other.

(D) Neatly harness wires together within racks by power level classification using horizontal and vertical wiring supports as required. Rigidly support all wires within 6" of fixed connection points. Leave service loops of sufficient lengths to allow rack hinges or slides to fully extend to facilitate access to rear panel connectors from the front of each rack. Do not use self-adhesive anchor pads for support of cables.

(E) Observe consistent polarity throughout the audio systems as follows:

a) Use only balanced differential inputs throughout all audio systems unless otherwise noted.

b) Use approved transformers where directed to reduce objectionable system noise to acceptable levels.

(F) Exercise care in wiring to avoid damaging the cables and equipment. Use grommets around cutouts and knockouts where conduit or chase nipples are not installed. Use bushings where conduit terminal connections are exposed in or out of junction boxes.

(G) Cut off unused wire ends approximately one-half inch (1/2") past the wire jacket. Fold them back over the jacket, and secure in place with heat-shrink tubing. In multi-conductor cables, preserve all unused conductors for future use. Failure to do so may result in replacement of cables at the contractor's expense.

(H) Provide a minimum 6" service loop or enough cable to allow for three (3) subsequent terminations which ever is greater.

(I) All cable jacket exposed stripped ends shall be dressed with the appropriate sized heat shrink.

(J) All drain cables shall be protected from the jacket strip to the point of termination. Exposed bare wire is not acceptable.

(K) Make all connections using rosin-core solder in conjunction with approved mechanical connectors unless other is specified by manufacturer. Connect microphone, control, and line level wiring through approved connectors. Connect speaker level wiring using approved terminal barrier strips. Mount all terminal devices on a non-conductive (electrically) rigid sur- face. Provide 10% spare terminals at each location. Label each terminal with a unique number.

(L) Make all power amplifier output connections directly into amplifier binding posts, friction fit connectors are not acceptable. In the event the amplifier doesn't have binding posts, and has barrier strip connections, crimp and solder the appropriate fork lug to the cable and torque screws to manufacturer's specification.

(M) All fiber optic cable splicing shall utilize the fusion splice method. The maximum allowable loss per fusion splice shall be 0.5 dB.

4. LABELING

(A) Label products in a logical, legible, and permanent manner corresponding to the Drawings.

Wording, format, style, color, and arrangement of text will be subject to the Owner and/or Owner's representative's approval. Submit samples and labeling schedule for approval.

Labeling will be verified at final adjustment and equalization

(B) Label all wall plates for input, output, and control receptacles as well as connector mounting plates in all boxes using 1/8" engraved lettering filled with black or contrasting paint, as approved.

(C) Use engraved plastic labels similar to Lamicoid, squarely and permanently attached, to label the following:

a) Patch panel designation strips.

b) Front and back of all rack mounted equipment including controls

c) Barrier strips, terminals, transformers, switches, relays, volume controls, and similar devices.

(D) Label pushbutton switches with engraved lettering filled with contrasting color paint.

(E) Label all permanently installed wires on both ends with approved permanent clip-on type or sleeve type markers. Wrap-around adhesive labels will not be accepted unless completely covered with clear heat shrink tubing.

(F) Label all portable equipment with engraved block letters using initials and/or words. Label all portable cables similarly with printed heat-shrinkable tags located 12 inches from the male connector end. Verify lettering through the Owner and/or Owner's representative prior to engraving or printing.

(G) Label access panels and backboards with designations corresponding to the drawings. Where devices are concealed above access ceilings, provide permanent lamicoid labels, on the ceiling supports corresponding to the drawings in finishes and sizes approved by the Owner and/or Owner's representative.

5. FIELD QUALITY CONTROL TESTS

(A) Maintain a competent supervisor and supporting technical personnel, acceptable to the Owner and/or Owner's representative during the entire installation.

(B) Before connecting any equipment to AC power outlets, measure the AC voltages between hot, neutral, and ground and verify correct voltage and polarity of AC power. Equipment damaged by connecting to improperly wired outlets shall be replaced at no addition cost to the Owner.

(C) Upon completion of the system installation, it shall be the responsibility of the contractor to perform the necessary adjustments and balancing of all signals and amplifier gain, and other level controls to ensure proper system operation. The Owner shall physically inspect the system and/or Owner's representative to assure that all equipment is installed in a neat and workmanlike manner as called for by the plans and specifications.

(D) Determine the proper sequence of energizing systems to minimize the risk of damage.

(E) After successfully energizing the systems, make all preliminary adjustments and document the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, gains and losses, as applicable.

(F) Verify the performance parameters of the individual systems following established professional procedures, in addition to those specified herein.

(G) Measure and record impedance curves of all loudspeaker lines at amplifier rack terminal barrier strips prior to connecting to amplifier outputs.

(H) Apply a sinewave sweep signal to each loudspeaker system, sweeping from 50 Hz to 5000 Hz at a sound pressure level which is 10 dB below the loudspeaker's rated electrical input power. Listen for rattles or objectionable noise and correct if apparent.

(I) Using a +4 dBm sine-wave input, set controls of each component to produce a +4 dBm sine-

wave output. Under these conditions (unity gain), the presence of any waveform, distortion, interference signals, or oscillations shall be unacceptable.

(J) Check for proper polarity of ceiling mounted loudspeakers by applying music program or pink noise to each system and walking through the transition areas of coverage from one loud- speaker to the next. Transition should be smooth with no apparent shifting of source from one loudspeaker to the next.

(K) Drive each ceiling distributed loudspeaker system with one octave of pink noise centered at 1000 Hz at a sound pressure level which is at least 10 dB above the ambient noise. Adjust power amplifiers to provide uniform distribution of sound throughout the seating areas within a tolerance of ±3 dB. Use an ANSI Type 2 sound level meter set for slow meter damping to take readings at seated ear height.

(L) Individually drive each reinforcement loudspeaker with one octave of pink noise centered at 1000 Hz at a sound pressure level, which is at least 10 dB above the ambient noise. Adjust power amplifiers to provide an equal sound pressure level from each loudspeaker on its aiming axis in the seating area. Use an ANSI Type 2 sound level meter set for slow meter damping to take readings at seated ear height.

(M) Upon completion of initial tests and adjustments, notify the Owner and/or Owner's representative the system is ready for final equalization and acceptance testing.

6. TEST EQUIPMENT

(A) Provide the following test equipment on site during construction and available to the Owner and/or Owner's representative during final adjustment and acceptance testing:

a) Digital multi-meter

b) 100 MHz Dual Trace Storage Oscilloscope

c) Video Test Pattern Generator *(XGA, Component, YC and Composite)*

d) Sine/Square Wave Generator

e) Impedance Bridge

f) Sound Level Meter - ANSI Type 2 with one-octave filter set

7. FINAL ADJUSTMENT AND EQUALIZATION

(A) Schedule a time for the Owner and/or Owner's representative to perform the Final Adjustment and Equalization. Notify the Owner and/or Owner's representative and Consultant at least twenty one (21) days in advance.

(B) Furnish project lead installer to assist the Owner and/or Owner's representative during the Final Adjustment and Equalization.

(C) Audio Systems acceptance tests shall employ an approved sound level meter, and spectrum analyzer and digital multi-meter to be provided by the contractor. Measurements shall be made at the combined output of the amplifiers and at selected locations throughout the facility.

(D) Video Systems acceptance tests shall employ and approved video test pattern generator, PC with min. XGA output and a 100MHz dual trace storage oscilloscope. Measurements shall be made at the point of signal origination and compared to signal at the display device. Minimum requirements at the display device shall be a rise time no greater then 7.5ns (5ns preferred) and amplitude of .7 volts.

(E) Record final settings on all equipment and submit with contract closeout documents.

8. CLEAN UP

(A) Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed on a daily basis unless designated for storage.

(B) Clean all areas around system equipment and be sure that the inside of each equipment rack is free of cut wire ends, solder splatters, and other debris.

9. DEMONSTRATIONS AND TRAINING

(A) Furnish a technician who is qualified to operate and maintain the systems specified in this Section to instruct Owner designated personnel regarding the design features and proper operation of the systems.

(B) If requested by the Owner, furnish the same technician/instructor during the first formal use of each system to further instruct and assist Owner personnel in system operation.

(C) Upon completion of the Work, the Owner and/or Owner's representative may elect to verify test data as part of the acceptance procedure. Provide personnel and equipment, at the convenience of the Owner and/or Owner's representative, to reasonably demonstrate system performance and to assist with such tests without additional cost to the Owner and/or Owner's representative.

10. FINAL PROCEDURES

(A) Perform any and all remedial work to correct inadequate performance or unacceptable conditions of, or relating to any of this work, as determined by the Owner and/or Owner's representative, at no additional expense to the Owner and/or Owner's representative.

(B) Furnish all portable and loose equipment to the Owner along with complete documentation of the materials presented. All portable equipment shall be presented in the original manufacturers packing, complete with all included instructions and miscellaneous manuals and documents.

(C) Test Reports and Certificates:

a) Document all acceptance testing, calibration and correction procedures described herein with the following information:

b) Parameters measured and their values, including values measured prior to calibration or correction, as applicable.

c) Parameters associated with calibration or corrective networks, components, or devices.

d) All software shall have certified backups and escrow provisions reviewed with the Owner and/or Owner's representative and equipment supplier.

e) Provide all operational software, configuration files, source code, and final settings and adjustment, in Compact Disc format, sleeved in the final documentation binder. The configurations, and source code become the sole property of the owner at project completion

f) A list of all equipment, indicating manufacturer, model number, serial number and equipment location (rack/room number). Update following acceptance testing if modified.

(D) Present, review and clarify all materials to the Owner and/or Owner's representative and/or operating personnel and fully demonstrate the operation and maintenance of the systems, equipment, and devices specified herein.

(E) Check, inspect, and if necessary, adjust all systems, equipment, devices and components specified, at the Owner's convenience, approximately thirty (30) days after the Owner acceptance of this work.

END OF SECTION 274100

SECTION 310000 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and other Specification Sections within this project manual, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Extent of earthwork is indicated on drawings. This work consists of grading in order to achieve finished elevations shown on the construction plans.
2. Preparation of subgrade for slabs, walks, concrete swales and pavements is included as part of this work.
3. All graded surfaces shall be smooth and uniform, without abrupt changes in slope or grade. Areas to be covered with paving shall be fine graded to the required elevations and slopes. Finished surfaces in all other areas may vary up to 0.1 feet from the required elevations.
4. Excavating and backfilling of trenches for storm sewer is included in work of this section.
5. Excavating and Backfilling for Mechanical/Electrical Work: Excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances is included as work of this section.

1.3 DEFINITIONS

A. Excavation consists of removal of material encountered to subgrade elevations indicated or below subgrade elevations as directed by the Engineer and subsequent disposal of materials removed.

B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect/Engineer. Unauthorized excavation, as well as remedial work directed by Architect/Engineer, shall be at Contractor's expense. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect/Engineer.

C. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect/Engineer.

D. Additional Excavation: When excavation has reached required subgrade elevations, notify Architect/Engineer, who will make an inspection of conditions. If Architect/Engineer determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Architect/Engineer.

C. Subgrade: The undisturbed earth or the compacted soil layer immediately below base, fill, or topsoil materials.

D. Structure: Buildings, foundations, slabs, tanks, curbs, end walls, mitered end sections, inlets, manholes, or other man-made stationary features occurring above or below ground surface.

1.4 SUBMITTALS

A. Test Reports: Submit the following reports directly to Architect/Engineer from the testing services, with copy to Contractor:

1. Test reports on borrow material.
2. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
3. Field reports; in-place soil density tests.
    a. One optimum moisture-maximum density curve for each type of soil encountered.
    b. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction. All material and construction methods shall be in accordance with Section 120 of the Standard Specification for Roads and Bridges, State of Florida, Department of Transportation, latest edition.

B. Testing and Inspection Service: Employ, at the Contractor’s expense, a geotechnical testing laboratory, acceptable to the Owner, to perform soil testing and inspection service for quality control testing during earthwork operations. Contractor shall replace materials removed for testing purposes. Should any work of materials fail to meet the requirements set forth in the plans and specifications, Contractor shall pay for re-testing of same.

1.6 PROJECT CONDITIONS

A. Site Information:

1. Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Architect/Engineer and the Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.
2. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

B. Existing Utilities:

1. Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.

2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of Architect/Engineer and utility owner.
3. Do not interrupt existing utilities serving any facility during occupied hours, except when permitted in writing by Architect/Engineer and then only after acceptable temporary utility services have been provided.
4. Provide minimum of 48-hour notice to Architect/Engineer, and appropriate Utility company and receive written notice to proceed before interrupting any utility.
5. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.
6. Perform Excavation by hand within drip line of trees to remain. Protect root systems from damage or dry out to the greatest extent possible. Maintain moist conditions for root system and cover exposed roots with moistened burlap.

C. Use of Explosives: Use of explosives is not permitted.

D. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights.
2. Operate warning lights as recommended by authorities having jurisdiction.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.1 FILL

A. Soils used as fill shall be clean sands. Non-structural fill shall contain less than 5 percent material passing the No. 200 sieve, and structural fill shall contain less than 12 percent material passing the No. 200 sieve. The sand shall have a maximum dry density of at least 100 pounds per cubic foot according to the Standard Proctor Compaction Test, (ASTM D 698). Soil materials shall be free of debris, waste, frozen materials, vegetation and other deleterious matter.

B. In order to insure proper bond and prevent slipping between the original ground and fill, the surface of the original ground shall be scarified to a depth of at least three inches. Each layer of fill material shall be compacted until the required density is achieved.

2.2 CUT

A. Where required, the site shall be excavated to the grades depicted upon the plans. Excavated material that is suitable shall be used in the fill sections of the site. Any excess material shall be hauled away from site.

PART 3 - EXECUTION

3.1 GENERAL

A. The site shall be stripped of all organic and deleterious materials in phases, so as to prevent and impede erosion and sedimentation.

3.2 COMPACTION OF SUBGRADE, CUT AND FILL:

A. Compaction requirements shall be as determined by the Modified Proctor Test (ASTM D1557 or AASHTO T-180) or Standard Proctor Test (ASTM D 698) on existing soils, with a soil at or near optimum moisture content. In unpaved areas the top 8 inches of subgrade shall be compacted to a minimum soil density of 95% of the Standard Procter Test with large traffic sized non-vibratory equipment. In paved areas the top 12 inches of subgrade shall be compacted to a minimum soil density of 98% of the Modified Proctor Test. All roots and other materials that would diminish the efficiency of the compaction operation shall be removed prior to compacting.

B. Remove and replace or scarify and air dry soil materials that are too wet to permit compaction to specified density. Only suitable materials free from excessive moisture shall be used for fill or backfill. Suitable soil materials that have been removed because they are too wet and compaction cannot occur, may be stockpiled or spread and allowed to dry. Assist in drying may be by discing, harrowing, or pulverizing until the moisture content is reduced to a satisfactory value.

3.3 STABILIZED SUBGRADE

A. Subgrade stabilization shall be done in accordance with applicable portions of these specifications.

3.4 EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

3.5 STABILITY OF EXCAVATIONS

A. All excavation work shall conform to OSHA Publication "Excavations 2226," 1990 Revision, and OSHA Excavation; Final Rule 29, CFR, Part 1926, October 31, 1989. The Contractor will provide written assurance of compliance with the law and with the laws of Florida Chapter 90-96.

B. The Contractor's method of providing protective support to prevent cave-ins shall be submitted with the Bid and conform to OSHA requirements. Slope excavations, shoring, and trench box usage in the field be based on tabulated data and designed by the Contractor.

C. Shoring and Bracing:

1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.
2. Provide permanent steel sheet piling or pressure treated CCA timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

C. The Contractor shall do all shoring required to perform and protect the excavation and as necessary for the safety of the employees.

3.6 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

B. The Contractor shall prevent the accumulation of water in the excavated areas, and shall remove by pumping or other means, any water which accumulates in the excavation. The Contractor shall prevent the accumulation of water in both structural and trench excavations and shall remove by well point system or by other means, water which accumulates in the excavation. The Contractor shall provide, install, operate and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. The Contractor shall include the cost of this equipment and work in the price he bids for the work.

C. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

D. The Contractor shall be responsible for and ensure all effluent water from the dewatering operations meets or exceeds F.D.E.P. and C.O.E. water quality standards prior to entering jurisdictional water bodies.

3.7 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.

B. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

C. Dispose of excess excavated materials not acceptable for use as backfill or fill offsite in a legal manner

3.8 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.

B. Excavations for footings and foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.9 EXCAVATION FOR PAVEMENTS

A. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

3.10 TRENCH EXCAVATION FOR STORM PIPES, CONDUIT AND IRRIGATION PIPES

A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

B. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

C. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.

D. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

E. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads ensure continuous bearing of pipe barrel on bearing surface.

3.11 OTHER EXCAVATIONS

A. Excavation for manholes, catch basins, junction boxes and other accessories shall be sufficient to leave at least 12 inches in the clear between their outer surfaces and the embankment of timber that may be used to protect them. Backfill of earth around manholes shall be filled with thoroughly compacted sand or gravel at the expense of the Contractor.

B. Excavations for footings and foundations shall be made to the dimensions and elevations indicated on the drawings, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottom to required lines and grades to leave solid base to receive other work.

C. Excavations for Mechanical or Electrical structures shall be made to the dimensions and elevations indicated on the drawings and a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and inspection. Do not disturb bottom of excavations intended for bearing surface.

D. Excavation for all structures shall be made to the dimensions and elevation indicated on the drawings. Where the excavation is made below the indicated elevations, the excavation shall be restored to the proper elevation with concrete fill, or the heights of the walls and footings shall be increased. Such fill or increased height of walls and footings shall be furnished by the Contractor without extra compensations, except where additional excavation is ordered to obtain proper bearing in which case the contract price will be adjusted to cover such additional work.

3.12 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.13 BACKFILL AND FILL

A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below.

1. Under grassed areas, use satisfactory non-structural fill excavated or borrow material.
2. Under walks and pavements, use satisfactory structural fill excavated or borrow material, or a combination.
3. Under piping and conduit and equipment, use structural fill satisfactory excavated or borrow materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.
4. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.
5. Concrete is specified in appropriate section.
6. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Architect/Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.

2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded

C. Removal of concrete formwork.

1. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

D. Removal of trash and debris from excavation.

1. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.14 BACKFILLING:

A. Trenches shall be backfilled with excavated materials, free from large clods or stones. Backfill shall be deposited in layers not to exceed 6-inches (6") in thickness, moistened, and compacted to density equal to or greater than 95% of the Modified Proctor Density (ASTM D1557), to a minimum depth of 12-inches over the pipe. The remainder of the backfill shall be placed in 8-inch layers compacted to 95% maximum density of the Modified Proctor Test unless the backfill is beneath paved or building areas in which case it shall be compacted to 98% of the Modified Proctor Test.

B. Selected Materials shall be used for all backfill, Trash shall not be allowed to accumulate in spaces to be backfilled, and this space shall be well cleared before backfill is placed.

C. No fill material shall be placed, spread or rolled while the ground or fill is frozen or thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until the moisture content and density of the fill are as previously specified.

3.15 GRADING (Only as Applicable per Plans)

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.

1. Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
2. Concrete Swales: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
3. Walks: Shape surface of areas under pavement to line, grade and cross-section, with finished surface not more than 1/2" above or below required subgrade elevation.
4. Pavements: Shape surface of areas under pavement to line, grade, and cross-section with finish surface not more than ½ inch above or below required subgrade elevation.

B. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.16 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

B. A minimum of one compaction test shall be performed on each different type of material encountered which will be subject to applicable field density tests.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.
2. Field density tests may also be performed by the nuclear method in accordance with ASTM D 2922, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D 3017.
3. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect/Engineer.
4. Footing Subgrade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata when acceptable to Architect/Engineer.
5. Paved Areas: Perform at least one field density test of subgrade for every 1000 sq. yd. of paved area at 8 inches below subgrade in cut sections. In each compacted fill layer, perform one field density test for every 1000 sq. yd. of paved area. Location of tests shall be determined by the Architect/Engineer.
6. Unpaved Areas: Perform at least one field density test of subgrade for every 2000 sq. yd. of non-paved area at 8 inches below subgrade in cut sections. In each compacted fill layer, perform one field density test for every 2000 sq. yd. of non-paved area. Location of tests shall be determined by the Architect/Engineer.
7. Trench Backfill: Field tests shall be made at the minimum rate of one test per layer of backfill per 400 linear feet of trench or at least one test per layer of backfill per run of pipe.
8. If in opinion of Architect/Engineer, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained at no additional cost.

3.17 EROSION CONTROL

A. The Contractor shall be responsible for the prevention of erosion from the site, the control of turbidity generated on site and for maintaining graded surfaces, for the duration of the project. The Contractor shall take whatever steps necessary to prevent erosion and will be responsible for any damages which might occur to down-land properties as a result of increased run-off from the site during site work construction. Erosion control methods shall be in accordance with requirements of authorities having jurisdiction.

3.18 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 EXISTING UTILITY LINES

A. Attention is called to the fact that the Contractor is responsible for contacting all utility companies to obtain locations of all existing utilities or obstructions which he may encounter during construction. After location of utilities by the appropriate utility company and Owner, it is the Contractor's liability to protect all such utility lines, including service lines and appurtenances, and to replace at his own expense any which may be damaged by the Contractor's equipment or forces during construction of the project.

3.20 BARRICADES, GUARDS, AND SAFETY PROVISIONS

A. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns and guards as required shall be placed and maintained by the Contractor during the progress of the construction work. Rules and regulations of the local authorities with respect to safety provisions shall be observed.

3.21 TRAFFIC CONTROLS

A. Excavations for pipe laying operation shall be conducted in a manner to cause the least interruption to traffic. When traffic must cross open trenches, the Contractor shall provide suitable bridges.

3.22 FLOW DRAIN AND SEWER MAINTENANCE

A. Adequate provision shall be made for the flow of sewers, drains, and water courses encountered during construction, and the structures which may have been disturbed shall be satisfactorily restored by the Contractor.

3.23 PROPERTY PROTECTION

A. Trees, fences, poles, manholes, and all other property shall be protected unless their removal is authorized; and any property damaged shall be satisfactorily restored by the Contractor at the Contractor's expense.

3.24 CLEAN-UP

A. Before final inspection and acceptance the Contractor shall clean ditches, shape shoulders and restore all disturbed areas, including street crossings, grass plots, re-grassing if necessary, to as good a condition as existed before work started. All trenches shall be leveled, and loose material removed from pavement, gutters, and sidewalks, employing hand labor if necessary.

3.25 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including trash, and debris and dispose of campus in a legal manner.

END OF SECTION 31 00 00

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Site clearing work includes, but is not limited to:

1. Protection of existing trees to remain.
2. Protection of existing improvements
3. Removal of trees and other vegetation.
4. Topsoil stripping.
5. Clearing and grubbing.
6. Removing above-grade improvements.
7. Removing below-grade improvements.

1.3 PROJECT CONDITIONS

A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.

1. Protect improvements on adjoining properties and on Owner's property.
2. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

C. Salvable Improvements: Carefully remove items indicated to be salvaged, and store on Owner's premises where indicated or directed.

D. Protection of Existing Trees and Vegetation - Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

E. Water vegetation to remain within limits of the contract work as required to maintain their health during course of construction operations.

F. Provide protection for roots over 1-1/2" diameter cut during construction operations. Coat cut faces with emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues.

Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

PART 2 - PRODUCTS

Not applicable to this Section.

PART 3 - EXECUTION

3.1 SITE CLEARING

A. General:

1. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. "Removal" includes digging out and off-site disposing of stumps and roots.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner, where such roots and branches obstruct installation of new construction.

B. Topsoil:

1. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
2. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
3. Remove heavy growths of grass from areas before stripping.
4. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
5. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.
6. Dispose of unsuitable or excess topsoil same as specified for disposal of excess material excavated in Earthwork section.

C. Clearing and Grubbing:

1. Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing.
2. Completely remove stumps, roots, and other debris protruding through ground surface.
3. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.
4. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
5. Place fill material in accordance with Geotechnical Report recommendations.

D. Removal of Improvements:

1. Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

3.2 DISPOSAL OF WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials and debris from property site and dispose of in a legal manner.

B. Burning on Owner's Property: NO burning will be permitted on the Owner’s property.

END OF SECTION 31 10 00

SECTION 312300 – TRENCHING & EXCAVATION

PART 1: GENERAL

1.1 General Description of Work

A. Excavation, shoring, dewatering, pipe bedding, trench backfill, compaction, grading and cleanup of all pipeline trenching for the project.

B. All work must be done in accordance with these specifications and the safety requirements of the State and OSHA standards.

C. Drawings and general provisions of Contract, including General and Supplementary Conditions, Earthwork Specification section and other specifications sections in this project manual, apply to work of this section.

1.2 Job Conditions

A. Accept site in condition existing during Contract time frame.

B. Groundwater/surface water found during construction are conditions of the Contract and responsibility of Contractor.

PART 2: PRODUCTS

2.1 Pipe Bedding and Backfill

A. Determination of source of materials for bedding and backfill shall be responsibility of Contractor, but use of such materials shall be subject to approval of Architect/Engineer.

B. Pipe bedding shall be angular material.

2.2 Sand Backfill: (Where specified on plans). Use sand or fine aggregate with source of material subject to approval of Architect/Engineer (See Earthwork Section 31 00 00).

2.3 Cradling Rock: Use crushed rock or stone with 70-100% passing 1" sieve and no more than 50% passing 3/4" sieve. Crushed oyster shells are acceptable.

2.4 Sheeting, Shoring and Bracing:

A. Use sound timber or structural steel.

B. Use shapes and sizes as required.

PART 3: EXECUTION

3.1 General

A. Dewatering:

1. Prevent surface water from flowing into excavation.
2. Provide equipment for handling water encountered as required. Obtain approval of proposed method of dewatering.
3. No sanitary sewer shall be used for disposal of trench water.

B. Protection of Existing Utilities:

1. Notify all utilities of location and schedule of work.
2. Locations and elevations of utilities shown on plans are to be considered approximate only. The contractor shall employ the use of Ground Penetrating Radar (GPR) equipment by a qualified company and personnel to locate, identify and protect existing underground utilizes in the area of work. Any utilities spotted shall be drawn on the site plan provided by the Architect/Engineer and submitted as part of the “As-Built” drawings. Cost of GPR locates shall be included in the contractors base bid. Notify utility and Architect/Engineer of conflicts between existing and proposed facilities.
3. Repair, relay or replace existing utilities damaged, destroyed or disrupted during work. Unless specified otherwise, replacement will be at the Contractor's expense.

C. Sheeting, Shoring and Bracing:

1. Provide as necessary, to hold walls of excavation, prevent damage to adjacent structures, and to protect workmen and property.
2. Leave sheeting and shoring in place where removal might cause damage to work or as otherwise indicated on drawings.
3. When moveable trench shield is used below spring line of pipe, it shall be lifted prior to any forward movement to avoid pipe displacement.

D. Changes in Grade:

1. Minor adjustments to grades may be made from plan grades to suit unforeseen construction conflicts or conditions with approval from Architect/Engineer.
2. No additional compensation will be made for such minor changes.

3.2 Excavation and Trenching

A. General:

1. Method of excavation at Contractor's option.
2. The Contractor will use caution when excavating under tree roots and under and around structures and utilities. Excavate by hand when necessary or appropriate.
3. Stockpile and replace topsoil equal to preexisting depth for surface restoration in grassed or agricultural areas where specified or shown on plans.

B. Trench Characteristics:

1. Depth: As indicated for pipe installation to lines and grades required with proper allowance for thickness of pipe and type of bedding specified or indicated.
2. Width:

    a. Keep width of trench as narrow as possible and yet provide adequate room for backfilling and jointing.
    b. Maximum trench width of 30-inch or pipe O.D. plus 18 inches

where soil conditions permit.

3. Provide bell holes for each pipe joint where pipe bears on undisturbed earth.
4. Trench bottom shall be free of large stones and other foreign material.

3.3 Organic or Unstable Materials

A. Stop work and notify Architect/Engineer.

B. Perform remedial work as directed.

C. If material is judged unsuitable and removal is authorized, remove and replace with trench stabilizing material as directed by Architect/Engineer.

3.4 Rock Excavation

A. Excavate any rock to maintain minimum 6-inch clearance around pipe.

B. Dispose of rock material not suitable for backfill as directed by Architect/Engineer.

C. Use of explosives not permitted without prior written authorization from Owner and Architect/Engineer.

D. Provide Special Hazard Insurance covering liability for blasting operations.

3.5 Bedding

A. Place after bottom of trench has been excavated to proper depth and grade.

B. Place, compact and shape bedding material to conform to barrel of pipe to insure continuous firm bedding for full length of pipe.

3.6 Trench Backfill

A. Use excavated material backfill unless otherwise specified or directed.

B. Use suitable backfill for all trenches within 5 feet of buildings and beneath walks, parking areas, paved streets or existing exposed utilities (See Earthwork Section).

C. Initial Backfill:

1. Place after pipe has been bedded and checked for alignment, grade and internal obstructions.

2. Carry out in an orderly fashion after authorization to cover pipe has been given.
3. Allow no more than 300 feet of trench to be open at one time.
4. Do not backfill until concrete or mortar has sufficiently cured.
5. Record location of connections and appurtenances before backfilling.
6. Place by hand and hand tamp to not less than 12 inches above top of pipe, in layers not to exceed 6 inches in thickness, moistened and compacted to density equal to or greater than 95% of the Modified Proctor Density (ASTM D1557) .
7. Backfill simultaneously on both sides of pipe to prevent displacement.

D. Subsequent Backfill:

1. Place backfill into trench at an angle so that impact on installed pipe is minimized.
2. Compaction of all backfill material shall be performed in a manner that shall not crack, crush, and/or cause the installed pipe to be moved from the established grade and/or alignment.
3. Area under pavement and walks or within buildings shall be mechanically compacted to the top of the subgrade in 6 to 8 inch lifts to a minimum of 98 % of the Modified Proctor Density.
4. Areas not subject to vehicular traffic shall be backfilled and compacted in layers not more 8 inches and compacted to 95% of the Modified Proctor Density.
5. Compaction method at discretion of Contractor with following exceptions:

    a. If in Architect/Engineer's opinion compaction method presents potential damage to pipe, it will not be allowed.

    b. Compaction of any backfill material by flooding or jetting will require prior written authorization of Architect/Engineer.
6. Mound excavated materials no greater than 6 inches in open areas only.
7. Fill upper portion of trench with topsoil as specified hereinbefore.
8. No trench shall be open over night.

3.7 Excess Material: Dispose of waste excess excavated material as directed by Architect/Engineer.

3.8 Testing

A. Payment of failed tests will be the responsibility of Contractor.

B. Minimum of one soil proctor for each type of material encountered:

1. See Earthwork Section

C. In Place Density: Field tests shall be made at the minimum rate of one test per layer of backfill per 100 linear feet of trench or at least one test per layer of backfill per run of pipe.

1. ASTM D1556 (Sand Cone)
2. ASTM D2167 (Balloon)
3. ASTM D3017 (Nuclear)

END OF SECTION 31 23 00

SECTION 313116 - TERMITE & PEST CONTROL STANDARDS

A. General
Soil poisoning beneath the future building and the area around the perimeter of the building.

B. Specific
Treat with a non-repellant subterranean termiticide, registered by EPA. Termiticide used must meet the following standards. Active Ingredients: Fipronil:5-amino-1(2,6-dichloro-4(trifluoromethyl)pheny)4-(1,R,S) trifluoromethyl)sulfiny)-1-H-pyrazole-3-carbonitrile.80%

C. Application
Shall be strictly applied in accordance with the label, the National Pest Control Association and The Florida Department of Agriculture and Consumer Services: Memorandum #685

1. All aspects of the label will be done according to the specific job site requirements.
2. Termiticides will be mixed at the “maximum” ratio allowed as per individual label specifications.
3. All horizontal barriers will be treated at the rate of one gallon per ten square feet.
4. All vertical barriers will be treated at the rate of four gallons per ten linear feet (per foot of depth). Not to exceed four feet of depth.
5. All void barriers will be treated at the rate of two gallons per ten linear foot.
6. All critical areas, such as penetrations through slab, plumbing, conduit, electrical, etc will be treated at the rate of one gallon per square foot.
7. All foundation block shall be treated with termiticide before being filled with concrete.
8. Exterior applications will be done before sidewalks, porches, patios, and driveways etc are completed.
9. All final vertical applications will be done after final landscaping and grading is completed.
10. Applicator must have dedicated tank. Tank that is used for applying repellant type Termiticides will not be allowed.
11. The applicator shall prepare and show the District maintenance representative his calculations of application and the numbers will be verified by District maintenance representative.

D. Other

1. A School District maintenance representative may be present when the soil is being treated for termites. Therefore, The School District Maintenance Department and the Office of Facilities Planning must be notified at least 24 hours prior to the scheduled soil treatment. The Construction Contractor is responsible for contacting the Maintenance Department and Office of Facilities Planning for each individual scheduled Termiticide application. Maintenance can be reached at 469-5478, and Facilities Planning can be reached at 456-5660.
2. If the potential for a student’s safety exists due to overspray drift, pre-treatments may need to be scheduled for after school hours, (excluding weekends).
3. Applicator must wait until scheduled time for maintenance staff to arrive has elapsed by 15 minutes before mixing any chemical. If not, chemical that has been mixed will not be accepted as being at the proper ratio and may not be used.

4. Applicator must use termiticide from its original sealed container and opened in the presence of the District maintenance representative.
5. Container must have original label intact.
6. Applicator must furnish label and MSDS sheets of termiticides being used at the time of application to the District maintenance representative upon request.
7. Applicator must give sample of raw chemical and tank mix upon request of District maintenance representative.
8. Applicator must add marking die to each tank mix to insure uniform coverage.
9. Applicator may be required to make three or more separate trips to complete job.
10. The Contractor is responsible for making sure the contracted Pest Control firm is called back to perform all final applications.
11. If sidewalks, porches, patios, driveways, etc. are poured adjacent to the structure before area has been treated with termiticide. They must be removed for the area to be treated and built back. Patched drill holes in new construction will not be accepted.

E. Guarantee.

Treatment shall remain effective for not less than five (5) years from the date of the certificate of occupancy. The contractor shall furnish a written 5-year guarantee stating that if at any time during the 5-year period, ground nesting termites occur, treatment will be applied to exterminate all infestations without cost to owner. The School District Maintenance representative may be present at all re-treatments under the same conditions as treatment. There shall be no annual cost, to the owner, to keep the policy in effect for the full five (5) year period.

END OF SECTION 31 31 16

SECTION 321123 – GRADED AGGREGATE BASE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Specification Sections in this project manual, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of base course work is shown on drawings.

1.3 SUBMITTALS

A. Material Certificates: Provide copies of material certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds specified requirements.

1.4 JOB CONDITIONS

A. Graded aggregate base course may be placed when air temperature is above 30F (-1C) and rising.

B. Grade Control: Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

B. Graded Aggregate Base Course: Materials for the graded aggregate base shall meet the requirements of Section 204 (Graded Aggregate Base) of the FDOT Standard Specifications for Road and Bridge Construction latest edition.

2.2 SUBGRADE PREPARATION

A. It is the Contractor's responsibility that the finished roadbed section meets the bearing value requirements, regardless of the quantity of stabilizing materials necessary to be added. After the roadbed grading operations have been substantially completed, the Contractor shall make his own determination as to the quantity (if any) of stabilizing material, of the type selected by him, necessary for compliance with the bearing value requirements.

B. Remove loose material from compacted sub-base surface immediately before applying herbicide treatment.

C. Proof roll prepared base surface to check for unstable areas and areas requiring additional compaction.

D. Notify Architect of unsatisfactory conditions. Do not begin base work until deficient subgrade areas have been corrected and are ready to receive base.

2.3 PLACING BASE

A. General: Place base course as directed in Section 204 of FDOT Standard Specifications. Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness, as indicated on plans.

2.4 FIELD QUALITY CONTROL

A. General: Test in-place base courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Architect.

B. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

C. Base Course: 1/2", plus or minus.

D. Surface Smoothness: The finished surface of the base course shall be checked with a template cut to the required crown and with a 15-foot straightedge laid parallel to the centerline of the road. All irregularities greater than 1/4" shall be corrected by scarifying, and removing or adding base material as may be required, after which the entire area shall be re-compacted to meet the specified density requirements.

E. Compaction: Graded aggregate base shall be compacted to a minimum density of 98% of maximum density as determined by the Modified Proctor Compaction Test (ASTM D1557). Soil-cement base (if any) shall be compacted to a minimum density of 95% of the Modified Proctor Test (ASTM D1557). The graded aggregate base shall be compacted at a moisture content within 1% of the optimum moisture content determined for the base material, by the modified Proctor compaction test; moisture contents for the base materials should be maintained, in the noted range, until completion of the pavement operations. All test results are to be submitted to the Engineer prior to beginning paving operations.

F. Frequency of Field Density Test: One test per 400 square yards of paved area.

2.5 BASIS OF PAYMENT

A. Payment for base course will be per square yard of installed base.

END OF SECTION 32 11 23

DESTIN ELEMENTARY SCHOOL 3/4/5 CENTER
OKALOOSA COUNTY SCHOOL DISTRICT
OKALOOSA COUNTY, FLORIDA

SECTION 321216 - ASPHALT CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Specification sections in the project manual, apply to work of this section. The standard specifications referenced in this section refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.2 DESCRIPTION OF WORK

A. Extent of asphalt concrete paving work is shown on drawings.

B. Prepared base is specified in earthwork, and appropriate base sections.

1.3 SUBMITTALS

A. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide design mix for each type of asphalt concrete paving course for approval by the project Civil Engineer.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with FDOT Standard Specifications, latest edition, and with local governing regulations.

1.5 SITE CONDITIONS

A. Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 deg.F (10 deg.C), and when temperature has not been below 35 deg.F (1 deg.C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

B. Construct asphalt concrete surface course when atmospheric temperature is above 40 deg.F (4 deg.C), and when base is dry. Base course may be placed when air temperature is above 30 deg.F (-1 deg.C) and rising.

1.6 Grade Control: Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use locally available materials and gradations which exhibit a satisfactory record of previous installations.
B. Prime Coat: Cut-back asphalt type; AASHTO M 82 (ASTM D 2027) MC-30, MC-70 or MC-250.

C. Tack Coat: Emulsified asphalt; AASHTO M 140 (ASTM D 977) or M 208 (D 2397); SS-1, SS-1h,

CSS-1 or CSS-1h, diluted with one part water to one part emulsified asphalt.

D. Lane Marking Paint: Paint shall meet or exceed Federal Specification TT-P-1952B and conform to the reflective requirements of FDOT Specifications.

2.2 ASPHALT-AGGREGATE MIXTURE

A. Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with ASTM D 3515 and as recommended by local paving authorities to suit project conditions.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Remove loose material from compacted base surface immediately before applying prime coat.

B. Proof roll prepared base surface to check for unstable areas and areas requiring additional compaction.

C. Notify Architect/Engineer of unsatisfactory conditions. Do not begin paving work until deficient base areas have been corrected and are ready to receive paving.

D. Prime Coat: Apply at rate of 0.15 to 0.20 gal. per sq. yd., over compacted base. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.

E. Tack Coat:

1. Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.05 to 0.15 gal. per sq. yd. of surface.
2. Allow to dry until at proper condition to receive paving.
3. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.2 PLANT MIX ASPHALTIC SURFACE COURSE

A. General: This item shall consist of a wearing surface constructed of asphaltic concrete on a prepared base, in accordance with the plans and specifications.

B. Materials:

1. The materials and construction methods shall comply with those set forth for Super Pave Asphaltic Concrete in the latest edition of the FDOT Standard Specifications, Section 320, 330 and 334.
2. The asphaltic cement shall met the requirements of AASHTO Specification M-20, Viscosity Grade AC-20 (Penetration Grade 60-70).

C. Thickness: The thickness of the surface shall be as shown on the construction plans. This requirement shall be checked by cores and where a deficiency of more than 1/4" exists, the Contractor shall be required to correct the deficiency either by replacing the full thickness or overlaying the area to the satisfaction of the Architect/Engineer.

3.3 PLACING MIX

A. General: Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225 deg.F (107 deg.C). Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness.

B. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.

3.4 ROLLING

A. General:

1. Begin rolling when mixture will bear roller weight without excessive displacement.
2. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

C. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

D. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

E. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

F. Protection:

1. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
2. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.5 TRAFFIC AND LANE MARKINGS

A. Cleaning: Sweep and clean surface to eliminate loose material and dust.

B. Striping:

1. Paint shall meet or exceed Federal Specification II-P-1952B and conform to the reflective requirements of FDOT Specifications, Section 710.
   Color: White, Yellow, and Blue (Which ever is required)
2. Apply paint with mechanical equipment to produce uniform straight edges. Apply in 2 coats at manufacturer's recommended rates.

3.6 FIELD QUALITY CONTROL

A. General:

1. Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Architect/Engineer. Contractor to replace asphalt removed for testing purposes.
2. Should any work or materials fail to meet the requirements set forth in the plans and specifications, Contractor shall pay for retesting of same.
3. A minimum of two cores and density test shall be made to determine pavement thickness and density. Density test and determinations shall be per FDOT Standard Specifications Section 330-10. Architect/Engineer shall determine location of cores and test.

B. Thickness:

1. In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

   b. Surface Course: 1/4", plus or minus.

C. Surface Smoothness:

1. Test finished surface of each asphalt concrete course for smoothness, using 10' straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

   a. Base Course Surface: 1/4".

   b. Wearing Course Surface: 3/16".

   c. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template, 1/4".

2. Check surface areas at intervals as directed by Architect/Engineer.

END OF SECTION 32 12 16

SECTION 323113 – CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide chain link fencing and gates for permanent and construction fencing areas as indicated on drawings and/or as required to provide separation.

1.02 SUBMITTALS

A. Submit for approval product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fencing and fabric: 9 gage hot-dipped galvanized steel fencing and fabric with 2" mesh, knuckled top and bottom selvages. NO BARBED WIRE.

B. Accessories: Hot-dipped galvanized end, corner, and pull posts, line posts, gate posts, top rail, end caps, and accessories. Line posts shall be 2 ½” O.D. standard weight, schedule 40 galvanized steel pipe set in concrete. Provide 9 gage aluminum ties.

C. Gates: Swing type with galvanized steel pipe perimeter frame. Provide latch with padlock eye.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install materials in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

B. All gates shall have a minimum clear width of 72 inches to accommodate maintenance grass cutting equipment.

C. Restore or replace damaged components. Clean and protect work from damage.

END OF SECTION 32 31 13

SECTION 329219 - GRASSING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Extent of grassing work is as specified or shown on the construction plans. Sodded areas disturbed during construction shall be re-sodded to match existing. Areas to receive new sod shall have centipede sod installed.

1.3 QUALITY ASSURANCE

A. All seed used shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of invitation for bids. All seed shall be furnished in sealed standard containers, unless exception is granted in writing by the Owner. Seed which has become wet, moldy, or otherwise damaged in transit or in storage shall not be used. Fertilizer shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes cake or otherwise damaged, making it unsuitable for use, shall not be used. Seed, fertilizer and other grassing materials shall be stored under cover and protected from damage which would make then unacceptable for use.

1.4 SUBMITTALS

A. Approvals, except those required for field installations, field applications, or field tests shall be obtained before delivery of materials or equipment to the project. The results of laboratory tests performed on the topsoil material shall be submitted. The reports shall include the pH level, the amount of organic matter, and available phosphoric acid and potash of the soil intended for use in the work. Certificate of conformance will be required for the following:

1. Grass seed shall be certified by registered, certified seed association or a registered testing laboratory not more than ten months prior to seeding.
2. Sprigs
3. Fertilizer
4. Topsoil
5. Lime
6. Mulching

PART 2 - PRODUCTS

2.1 TOPSOIL

A. If the quantity of existing stored or excavated topsoil is inadequate for planting, sufficient additional topsoil shall e furnished. Topsoil furnished shall be a natural, fertile, friable soil, possessing

characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well-drained areas. Topsoil shall be without admixture of subsoil and free from Johnson grass (Sorghum halepense), nut grass (Cyperus rotundus) and objectionable weeds and toxic substances.

2.2 SOIL AMENDMENTS

A. LIME:

Ground limestone (Dolomite) shall contain not less than 85 percent of total carbonates, and shall be ground to such a fineness that 50 percent will pass a 100-mesh sieve and 90 percent will pass a 20-mesh sieve.

B. FERTILIZER:

Fertilizer shall be 16-16-16 formulation. The nitrogen shall be 60% urea-formaldehyde form. Fertilizer shall conform to the applicable State Fertilizer laws and shall be granulated so that 80 percent is held on a 16-mesh screen, uniform in composition, dry and free-flowing.

C. MULCH:

Clean hay or fresh straw mulch.

2.3 GRASS MATERIALS

A. GRASS SEED:

Federal Specifications JJJ-S-18 and shall satisfy the following requirements:

Seed	Pure Seed	Hard Seed	Weed Seed
Argentine Bahia	95%	15%	0.25%

B. Seed failing to meet the purity or germination requirements by not more than twenty-five percent may be used, but the quantity shall be increased to yield the required rate of pure live seed. Seed failing to meet the weed seed requirements shall not be used.

2.4 WATERING

A. Contractor shall be responsible for locating and connecting to existing irrigation lines. The connection to the irrigation lines and the usage of the water is to be coordinated with the Owner. If there is not water available to the site, the Contractor shall provide the water for grassing. Contractor shall include cost of watering in his bid.

PART 3 - EXECUTION

3.1 GRADING

A. Areas to be grassed shall be graded to remove depressions, undulations, and irregularities in the

surface before grassing.

3.2 PLACING TOPSOIL

A. Areas to be grassed shall have a minimum topsoil cover of two inches. Topsoil shall not be placed when the subgrade is excessively wet, extremely dry or in a condition otherwise detrimental to the proposed planting or proper grading.

3.3 TILLAGE

A. The area to be grassed shall be thoroughly tilled to a depth of four inches using a plow and disc harrow or rotary tilling machinery until a suitable bed has been prepared and no clods or clumps remain larger than 1-1/2 inches in diameter.

3.4 APPLICATION OF LIME

A. The pH of the soil shall be determined. If the pH is below 5.0, sufficient lime shall be added to provide a pH between 5.5 and 6.5. The lime shall be thoroughly incorporated into the top three to four inches of the soil. Lime and fertilizer may be applied in one operation.

3.5 APPLICATION OF FERTILIZER

A. Fertilizer shall be applied at the rate of 6 pounds per 1,000 square feet and shall be thoroughly incorporated into the top three to four inches of soil.

3.6 PLANTING SEEDS

A. All areas disturbed during construction shall be seeded as specified herein. Immediately before seeds are sown and after fertilizer and lime are applied, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable, and of uniformly fine texture. Areas to be grassed shall be seeded evenly with a mechanical spreader, raked lightly, rolled with a 200-pound roller, and watered with a fine spray.

1. Seed shall be applied at the following rate:

Seed	Rate of Application
Argentine Bahia	6 lbs./1000 sq. ft. 260 lbs./acre

2. Seeded areas shall be mulched at the rate of not less than 1-1/2" loose measurement over all seeded areas. Spread by hand, blower, or other suitable equipment. Mulch shall be cut into the soil with equipment capable of cutting he mulch uniformly into the soil. Mulching shall be done within 24 hours of the time seeding is completed.

3.7 ROLLING

A. After seeding and mulching, a cultipacker, traffic roller, or other suitable equipment shall be used for rolling the grassed areas. Areas shall then be watered with a fine spray.

3.8 WINTER COVER

A. All areas to be grassed shall be protected against erosion at all times. For protection during winter months (November 1st through March 31st) Italian rye grass shall be planted at the rate of four pounds per 1,000 square feet on all areas which are not protected by permanent grass.

3.9 CLEAN-UP

A. All excess soil, excess grass materials, stones, and other waste shall be removed from the site daily and not allowed to accumulate.

3.10 MAINTENANCE

A. Maintenance shall begin immediately following the last operation of grassing and continue until final acceptance. Maintenance shall include watering, mowing, replanting, and all other work necessary to produce a uniform stand of grass. Grassing will be considered for final acceptance when the permanent grass is healthy and growing on 97 percent of the area with no bare areas wider than 12 inches. Contractor shall include costs of maintenance in his bid.

3.11 ACCEPTANCE

A. The Contractor shall submit to the Architect/Engineer two copies of a written request for final acceptance of the grassing work. The request shall be submitted at least ten days prior to the anticipated date of acceptance. The condition of the grass will be noted, the Contractor will be notified if maintenance is to continue.

END OF SECTION 32 92 19

SECTION 329223 - SODDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other specifications sections within this project manual, apply to this Section.

1.2 DESCRIPTION OF WORK

A. This work consists of sodding areas cleared during construction and not paved, or as otherwise shown on the Construction Plans. All material and construction methods shall be in accordance with section 570 and 981 of the Florida Department of Transportation Standard Specifications, Latest Edition.

B. Sodding: Areas noted on Construction Plans shall be sodded.

1.3 MATERIAL

A. Use Argentine Bahia. The sod shall be live, fresh, and uninjured at the time of planting and shall have a thick mat of roots with enough adhering soil to assure growth. Sod shall be free of monofilament support netting prior to placement. No type of sod netting is acceptable. Apply sod within 48 hours of cutting or stack and keep moist. Do not plant dormant sod or if ground is frozen.

B. Placement: Prepare the ground by loosening the soil and raking. Place sod on the prepared soil to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to avoid a continuous downhill seam. Tamp or roll lightly to ensure contact with subgrade. Tamp the outer edges of the sodded area to produce a smooth contour. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass. Water sod thoroughly with a fine spray immediately after planting.

C. Watering: Keep sod continuously moist to a depth below the root zone for three weeks after placement. If there is not water available to the site, the Contractor shall provide the water for the sod, and include cost of same in his bid.

D. Maintenance: Maintain sod by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, re-grading, and re-planting as required to establish a lawn free of eroded or bare areas and acceptable to the Architect/Engineer. Where inspected work and materials do not comply with requirements, replace rejected work and continue maintenance until re-inspected by Architect/Engineer and found to be acceptable. Remove rejected materials promptly from the project site. Contractor shall include costs for maintaining sod in his bid.

1.4 WARRANTY

A. Contractor shall warranty all work and material for a period of 90 days beginning from date of acceptance of substantial completion.

END OF SECTION 32 92 23

SECTION 331100 - WATER DISTRIBUTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall be the most current issue.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 536	Ductile Iron Castings
ASTM B 61	Steam or Valve Bronze Castings
ASTM B 62	Composition Bronze or Ounce Metal Castings
ASTM C 94	Ready-Mixed Concrete
ASTM D 1785	Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2466	Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2564	Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2855	Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3139	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F 402	Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104/A21.4	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. (75 mm Through 1200 mm), for Water and Other Liquids
AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C153/A21.53	Ductile-Iron Compact Fittings, 3 in. Through 24 in. (76 mm Through 610 mm) and 54 in. Through 64 in. (1,000 mm Through 1,600 mm), for Water Service
AWWA C500	Metal-Seated Gate Valves for Water Supply Service
AWWA C502	Dry-Barrel Fire Hydrants
AWWA C508	Swing-Check Valves for Waterworks Service, 2 in. (50 mm) Through 24 in. (600 mm) NPS
AWWA C509	Resilient-Seated Gate Valves for Water and Sewerage Systems
AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651	Disinfecting Water Mains
AWWA C800	Underground Service Line Valves and Fittings
AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution
AWWA M23	PVC Pipe - Design and Installation

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC. (MSS)

MSS SP-80	Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	Installation of Private Fire Service Mains and Their Appurtenances

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3	Installation of Polyvinyl Chloride (PVC) Pressure Pipe
UBPPA UNI-B-8	Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe

UNDERWRITERS LABORATORIES INC. (UL)

UL 246	Hydrants for Fire-Protection Service
UL 262	Gate Valves for Fire-Protection Service
UL 312	Check Valves for Fire-Protection Service
UL 789	Indicator Posts for Fire-Protection Service

1.2 DESIGN REQUIREMENTS

A. Water Distribution Mains: Provide water distribution mains indicated as 4 through 12 inch diameter pipe sizes of ductile-iron or polyvinyl chloride (PVC) plastic pipe. Also provide water main accessories, gate valves and check valves as specified and where indicated.

B. Water Service Lines: Provide water service lines indicated as less than 4 inch lines from water distribution main to building service at the point indicated. Water service lines shall be polyvinyl chloride (PVC) plastic pipe. Provide water service line appurtenances as specified and where indicated.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES:

SD-03 Product Data

Piping Materials

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Hydrants

Indicator posts

Corporation stops

Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Shop-applied lining and coating

lining

Fire hydrants

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

SD-08 Manufacturer's Instructions

Installation procedures for water piping

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

B. Handling: Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench. Store plastic piping, jointing materials and rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

PART 2 PRODUCTS

2.1 WATER DISTRIBUTION MAIN MATERIALS

A. Piping Materials

1. Polyvinyl Chloride (PVC) Plastic Piping

a. Pipe and Fittings: Pipe, AWWA C900, shall be plain end or gasket bell end, Pressure Class 150 (DR 18) with cast-iron-pipe-equivalent OD. Fittings shall be gray iron or ductile iron, AWWA C110/A21.10 or AWWA C153/A21.53, and have cement-mortar lining, AWWA C104/A21.4, standard thickness. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph.

b. Joints and Jointing Material: Joints for pipe shall be push-on joints, ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be push-on

joints ASTM D 3139, or compression-type joints/mechanical joints, ASTM D 3139 and AWWA C111/A21.11. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe, ASTM F 477. Gaskets for push-on joints and compression-type joints/mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories, AWWA C111/A21.11, respectively, for push-on joints and mechanical joints. Mechanically coupled joints using a sleeve-type mechanical coupling, as specified in paragraph entitled "Sleeve-Type Mechanical Couplings," may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in ASTM D 3139.

B. Valves, Hydrants, and Other Water Main Accessories

1. Gate Valves on Buried Piping: AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 200 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.
2. Gate Valves: AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: AWWA C509 shall be nonrising stem type with flanged ends and a working pressure of 200 psi. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.
3. Check Valves: Swing-check type, AWWA C508 or UL 312. Valves conforming to: (1) AWWA C508 shall have iron or steel body and cover and flanged ends, designed for a working pressure of 200 psi. Valves shall have clear port opening. Valves shall be spring-loaded.
4. Fire Hydrants: Dry-barrel type. Paint hydrants with at least one coat of primer and two coats of yellow enamel paint, except use red enamel paint for tops of hydrants in non-potable water systems. Stencil hydrant number and main size on the hydrant barrel using black stencil paint.

a. Dry-Barrel Type Fire Hydrants: Dry-barrel type hydrants, AWWA C502 or UL 246, "Base Valve" design, shall have 6 inch inlet, 5 1/4 inchvalve opening, one 4 1/2 inch pumper connection, and two 2 1/2 inchhose connections. Pumper connection and hose connections shall be individually valved with independent nozzle gate valves. Inlet shall have mechanical-joint end only; end shall conform to the applicable requirements as specified for the joint. Size and shape of operating nut, cap nuts, and threads on hose and pumper connections shall be as specified in AWWA C502. Hydrants indicated as "traffic type," shall have frangible sections as mentioned in AWWA C502. The traffic type hydrant shall have special couplings joining upper and lower sections of hydrant barrel and shall be designed to have the special couplings break from a force not less

than that which would be imposed by a moving vehicle; hydrant shall operate properly under normal conditions.

5. Indicator Posts: UL 789. Provide for gate valves where indicated.
6. Valve Boxes: Provide a valve box for each gate valve on buried piping, except where indicator post is shown. Valve boxes shall be of cast iron or precast concrete of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Cast-iron box shall have a heavy coat of bituminous paint.
7. Sleeve-Type Mechanical Couplings: Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron and PVC plastic pipe, the middle ring shall be of cast-iron or steel; and the follower rings shall be of malleable or ductile iron. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111/A21.11. Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563, Grade A; or round-head square-neck type bolts, ANSI B18.5.2.1M and ANSI/ASME B18.5.2.2M with hex nuts, ASME/ANSI B18.2.2. Bolts shall be 5/8 inch in diameter. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint.
8. Tracer Wire for Nonmetallic Piping: Provide bare copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe.

2.2 WATER SERVICE LINE MATERIALS

A. Piping Materials

1. Plastic Piping: Plastic pipe and fittings shall bear the seal of the National Sanitation Foundation for potable water service. Plastic pipe and fittings shall be supplied from the same manufacturer.
   a. Polyvinyl Chloride (PVC) Plastic Piping: ASTM D 1785, Schedule 40; or ASTM D 2241, with SDR as necessary to provide 150 psi minimum pressure rating. Fittings, ASTM D 2466. Pipe and fittings shall be of the same PVC plastic material and shall be one of the following pipe/fitting combinations, as marked on the pipe and fitting, respectively: PVC 1120/PVC I; PVC 1220/PVC 12; PVC 2120/PVC II; PVC 2116/PVC II. Solvent cement for jointing, ASTM D 2564.
2. Insulating Joints: Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

B. Water Service Line Appurtenances

1. Corporation Stops: Ground key type; bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be suitable for solder-joint, or flared tube

compression type joint. Threaded ends for inlet and outlet of corporation stops, AWWA C800; coupling nut for connection to flared copper tubing, ASME/ANSI B16.26.

2. Curb or Service Stops: Ground key, round way, inverted key type; made of bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be as appropriate for connection to the service piping. Arrow shall be cast into body of the curb or service stop indicating direction of flow.
3. Gate Valves on Buried Piping (3 Inches and Larger): Gate valves 3 inch size and larger on buried piping AWWA C500 or UL 262 and of one manufacturer. Valves, AWWA C500, nonrising stem type with double-disc gates. Valves, UL 262, inside-screw type with operating nut, split wedge or double disc type gate, and designed for a hydraulic working pressure of 175 psi. Materials for UL 262 valves conforming to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals and shall be bolted and constructed so as to permit easy removal of parts for repair.
4. Gate Valves on Buried Piping (Smaller Than 3 Inches): Gate valves smaller than 3 inch size on buried Piping MSS SP-80, Class 150, solid wedge, nonrising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve. Provide handwheel operators.
5. Curb Boxes: Provide a curb box for each curb or service stop. Curb boxes shall be of cast iron of a size suitable for the stop on which it is to be used. Provide a round head. Cast the word "WATER" on the lid. Each box shall have a heavy coat of bituminous paint.
6. Valve Boxes: Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

A. General Requirements for Installation of Pipelines: These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

1. Location of Water Lines: Terminate the work covered by this section at a point approximately 5 feet from the building, unless otherwise indicated. Do not lay water lines in the same trench with gas lines fuel lines or electric wiring.

a. Water Piping Installation Parallel With Sewer Piping

(1) Normal Conditions: Lay water piping at least 10 feet horizontally from a sewer or sewer manhole whenever possible. Measure the distance edge-to-edge.

(2) Unusual Conditions: When local conditions prevent a horizontal separation of 10 feet, the water piping may be laid closer to a sewer or sewer manhole provided that:

(a) The bottom (invert) of the water piping shall be at least 18 inches above the top (crown) of the sewer piping.

(b) Where this vertical separation cannot be obtained, the sewer piping shall be constructed of AWWA-approved water pipe and pressure tested in place without leakage prior to backfilling.

(c) The sewer manhole shall be of watertight construction and tested in place.

b. Installation of Water Piping Crossing Sewer Piping

(1) Normal Conditions: Water piping crossing above sewer piping shall be laid to provide a separation of at least 18 inches between the bottom of the water piping and the top of the sewer piping.

(2) Unusual Conditions: When local conditions prevent a vertical separation described above, use the following construction:

(a) Sewer piping passing over or under water piping shall be constructed of AWWA-approved ductile iron water piping, pressure tested in place without leakage prior to backfilling.

(b) Water piping passing under sewer piping shall, in addition, be protected by providing a vertical separation of at least 18 inches between the bottom of the sewer piping and the top of the water piping; adequate structural support for the sewer piping to prevent excessive deflection of the joints and the settling on and breaking of the water piping; and that the length, minimum 20 feet, of the water piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer piping.

(c) Sewer Piping or Sewer Manholes: No water piping shall pass through or come in contact with any part of a sewer manhole.

2. Earthwork: Perform earthwork operations in accordance with Section 02211, "Trench Excavation, Backfill and Compaction."
3. Pipe Laying and Jointing: Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 2 1/2 feet.
4. Installation of Tracer Wire: Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.
5. Connections to Existing Water Lines: Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped, except as otherwise specified, tap concrete pipe in accordance with AWWA M9 for tapping concrete pressure pipe.

B. Special Requirements for Installation of Water Mains

1. Installation of PVC Plastic Water Main Pipe: Installation of PVC Plastic Water Main Pipe and Associated Fittings: Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines"; with the requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation."

   a. Jointing: Make push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel; for push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of UBPPA UNI-B-3 for laying the pipe and the recommendations in AWWA M23, Chapter 7, "Installation," for pipe joint assembly. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111/A21.11. Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.
   b. Pipe Anchorage: Provide concrete thrust blocks for pipe anchorage. Thrust blocks shall be in accordance with the requirements of UBPPA UNI-B-3 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.

2. Installation of Valves and Hydrants

   a. Installation of Valves: Install gate valves, AWWA C500 and UL 262, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C500. Install gate valves, AWWA C509, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509. Install gate valves on PVC water mains in accordance with the recommendations for appurtenance installation in AWWA M23, Chapter 7, "Installation." Install check valves in accordance with the applicable requirements of

AWWA C600 for valve-and-fitting installation, except as otherwise indicated. Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

b. Installation of Hydrants: Install hydrants in accordance with AWWA C600 for hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the 4 1/2 inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, contact the Architect/Engineer for further instructions.

C. Installation of Water Service Piping

1. Location: Connect water service piping to the building service where the building service has been installed. Where building service has not been installed, terminate water service lines approximately 5 feet from the building line at the point indicated; such water service lines shall be closed with plugs or caps.
2. Service Line Connections to Water Mains: Connect service lines 2 inch size and smaller to the main by a corporation stop and gooseneck and install a service stop below the frostline. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps. Connect service lines to PVC plastic water mains in accordance with UBPPA UNI-B-8 and the recommendations of AWWA M23, Chapter 9, "Service Connections."

D. Special Requirements for Installation of Water Service Piping

1. Installation of Plastic Piping: Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of ASTM D 2774, unless otherwise specified. Handle solvent cements used to join plastic piping in accordance with ASTM F 402.

a. Jointing: Make solvent-cemented joints for PVC plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with ASTM D 2855. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

b. Plastic Pipe Connections to Appurtenances: Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.

E. Disinfection: Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplying nonpotable water is not required.

3.2 FIELD QUALITY CONTROL

A. Field Tests and Inspections: The Architect/Engineer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when

required, that any item of work has been constructed in accordance with the drawings and specifications.

B. Testing Procedure: Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test ductile-iron water mains in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints shall not exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other method. Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of UBPPA UNI-B-3 for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in UBPPA UNI-B-3, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed.

C. Special Testing Requirements: For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

END OF SECTION 33 11 00

SECTION 333000 - SANITARY SEWAGE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The publications shall current be the most issue.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 74	Cast Iron Soil Pipe and Fittings
ASTM C 564	Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C 972	Compression-Recovery of Tape Sealant
ASTM C 990	Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM D 412	Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 624	Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 2321	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 4101	Propylene Plastic Injection and Extrusion Materials

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-6	Low-Pressure Air Testing of Installed Sewer Pipe

1.2 SYSTEM DESCRIPTION

1.2.1 Sanitary Sewer Gravity Pipeline

Provide mains and laterals of polyvinyl chloride (PVC) plastic pipe.

Provide new and modify existing exterior sanitary gravity sewer piping and appurtenances. Provide each system complete and ready for operation. The exterior sanitary gravity sewer system includes equipment, materials, installation, and workmanship as specified herein more than 5 feet outside of building walls.

1.3 SUBMITTALS

Submit the following in accordance with Section 01300, SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS:

SD-02 Shop Drawings

Precast concrete manhole

Metal items

Frames, covers, and gratings

SD-03 Product Data

Pipeline materials including joints, fittings, and couplings

Submit manufacturer's standard drawings or catalog cuts.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

1.4.1.1 Piping

Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.4.1.2 Cement, Aggregate, and Reinforcement

As specified in Section 03300, "Cast-In-Place Concrete".

1.4.2 Handling

Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Carry, do not drag, pipe to trench.

PART 2 PRODUCTS

2.1 PIPELINE MATERIALS

ASTM A 74, with ASTM C 564 compression-type rubber gaskets.

2.2 CONCRETE MATERIALS

Concrete materials shall be as specified in Section 03300, "Cast-In-Place Concrete."

2.3 MISCELLANEOUS MATERIALS

2.3.1 Precast Concrete and Associated Materials

2.3.1.1 Precast Concrete Manhole Sections

Precast concrete manhole risers, base sections, and tops shall conform to ASTM C 478. Base and first riser shall be monolithic.

2.3.1.2 Gaskets and Connectors

Gaskets for joints between manhole sections shall conform to ASTM C 443. Resilient connectors for making joints between manhole and pipes entering manhole shall conform to ASTM C 923 or ASTM C 990.

2.3.1.3 External Preformed Rubber Joint Seals

An external preformed rubber joint seal shall be an accepted method of sealing cast iron covers to precast concrete sections to prevent ground water infiltration into sewer systems. All finished and sealed manholes constructed in accordance with paragraph entitled "Manhole Construction" shall be tested for leakage in the same manner as pipelines as described in paragraph entitled "Leakage Tests." The seal shall be multi-section with a neoprene rubber top section and all lower sections made of Ethylene Proplene Di Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall consist of a top and bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be a non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. Extension sections shall cover up to two more adjusting rings. Properties and valves are listed in the following tables:

Properties, Test Methods and Minimum Values for
Rubber used in Preformed Joint Seals

Physical Properties	Test Methods	EPDM	Neoprene	Butyl mastic	
Tensile, psi	ASTM D 412	1840	2195	-	
Elogation percent	ASTM D 412	553	295	350	
Tear Resistance, ppi	ASTM D 624 (Die B)	280	160	-	
Rebound, percent, 5 minutes	ASTM C 972 (mod.)	-	-	11	
Rebound, percent, 2 hours	ASTM C 972	-	-	12	

2.3.2 Metal Items

2.3.2.1 Frames, Covers, and Gratings for Manholes

Cast iron; frames, covers, and gratings shall be as indicated.

2.3.2.2 Manhole Steps

Zinc-coated steel as indicated conforming to 29 CFR 1910.27. As an option, plastic or rubber coating pressure-molded to the steel may be used. Plastic coating shall conform to ASTM D 4101, copolymer polypropylene. Rubber shall conform to ASTM C 443, except shore A durometer hardness shall be 70 plus or minus 5. Aluminum steps or rungs will not be permitted. Steps are not required in manholes less than 4 feet deep.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

3.1.1 General Requirements for Installation of Pipelines

Apply except where specific exception is made in the following paragraphs entitled "Special Requirements."

3.1.1.1 Location

The work covered by this section shall terminate at a point approximately 5 feet from the building , unless otherwise indicated.

a. Sanitary piping installation parallel with water line:

(1) Normal conditions: Sanitary piping or manholes shall be laid at least 10 feet horizontally from a water line whenever possible. The distance shall be measured edge-to-edge.
(2) Unusual conditions: When local conditions prevent a horizontal separation of 10 feet, the sanitary piping or manhole may be laid closer to a water line provided that:
(a) The top (crown) of the sanitary piping shall be at least 18 inches below the bottom (invert) of the water main.
(b) Where this vertical separation cannot be obtained, the sanitary piping shall be constructed of AWWA-approved ductile iron water pipe pressure tested in place without leakage prior to backfilling.
(c) The sewer manhole shall be of watertight construction and tested in place.

b. Installation of sanitary piping crossing a water line:
(1) Normal conditions: Lay sanitary piping crossing water lines to provide a separation of at least 18 inches between the top of the sanitary piping and the bottom of the water line whenever possible.
(2) Unusual conditions: When local conditions prevent a vertical separation described above, use the following construction:
(a) Sanitary piping passing over or under water lines shall be constructed of AWWA-approved ductile iron water pipe, pressure tested in place without leakage prior to backfilling.
(b) Sanitary piping passing over water lines shall, in addition, be protected by providing:
1. A vertical separation of at least 18 inches between the bottom of the sanitary piping and the top of the water line.
2. Adequate structural support for the sanitary piping to prevent excessive deflection of the joints and the settling on and breaking of the water line.
3. That the length, minimum 20 feet, of the sanitary piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the water line.

c. Sanitary sewer manholes: No water piping shall pass through or come in contact with any part of a sanitary sewer manhole.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 02315, "Excavation and Fill."

3.1.1.3 Pipe Laying and Jointing

Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Lay nonpressure pipe with the bell or groove ends in the upgrade direction. Adjust spigots in bells and tongues in grooves to give a uniform space all around. Blocking or wedging between bells and spigots will not be permitted. Replace by one of the proper dimensions, pipe or fittings that do not allow sufficient space for installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batterboards for the same purpose.

3.1.1.4 Connections to Existing Lines

Obtain approval from the Owner before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

3.1.2 Special Requirements

3.1.2.1 Installation of PVC Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3.1.2.2 Cleanouts

Construct cleanouts of cast iron soil pipe and fittings.

3.1.3 Concrete Work

Cast-in-place concrete is included in Section 03300, "Cast-In-Place Concrete."

3.1.4 Manhole Construction

Construct base slab of cast-in-place concrete or use precast concrete base sections. Make inverts in cast-in-place concrete and precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. For cast-in-place concrete construction, either pour bottom slabs and walls integrally or key and bond walls to bottom slab. No parging will be permitted on interior manhole walls. For precast concrete construction, make joints between manhole sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Parging will not be required for precast concrete manholes. Cast-in-place concrete work shall be in accordance with the requirements specified under paragraph entitled "Concrete Work" of this section. Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose; install in accordance with the recommendations of the connector manufacturer. Where a new manhole is constructed on an existing line, remove existing pipe as necessary to construct the manhole. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding into the manhole. Use resilient connectors as previously specified for pipe connectors to concrete manholes.

3.1.5 Miscellaneous Construction and Installation

3.1.5.1 Metal Work

a. Workmanship and finish: Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blow holes that

may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well-defined lines and arises. Provide necessary rabbets, lugs, and brackets wherever necessary for fitting and support.

b. Field painting: After installation, clean cast-iron frames, covers, gratings, and steps not buried in concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. Do not paint surfaces subject to abrasion.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Owner will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.

3.2.2 Tests for Nonpressure Lines

Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line. When pressure piping is used in a nonpressure line for nonpressure use, test this piping as specified for nonpressure pipe.

3.2.2.1 Leakage Tests

Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

a. Infiltration tests and exfiltration tests: Perform these tests for sewer lines made of the specified materials, not only concrete, in accordance with ASTM C 969. Make calculations in accordance with the Appendix to ASTM C 969.

b. Low-pressure air tests: Perform tests as follows:

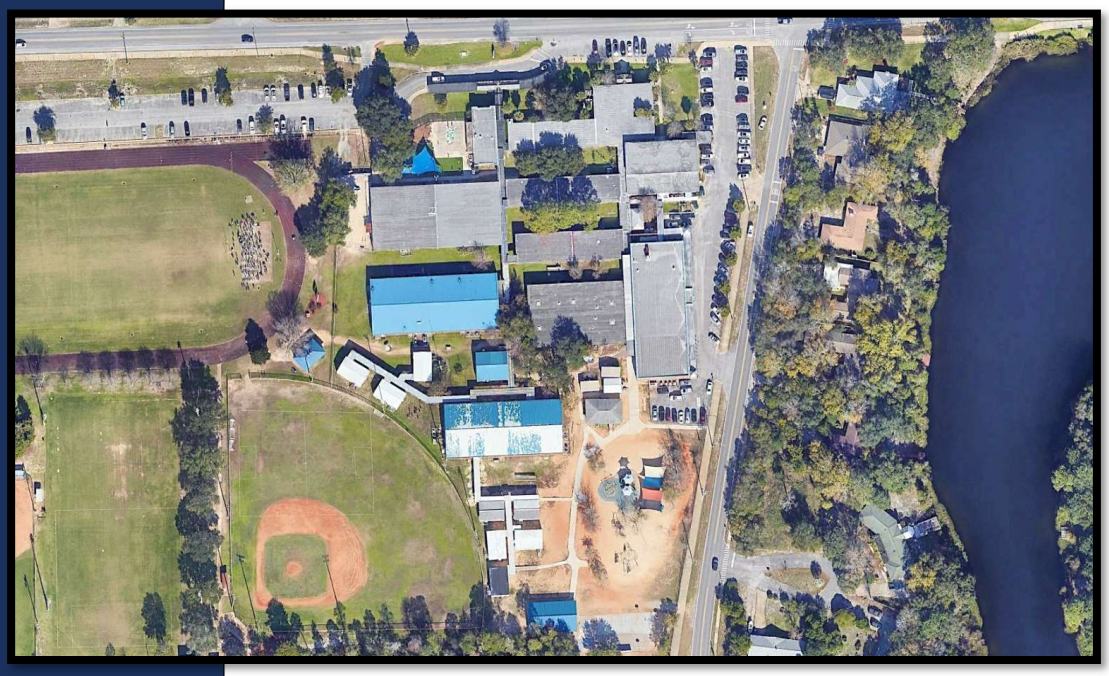
(1) PVC plastic pipelines: Test in accordance with UBPPA UNI-B-6. Allowable pressure drop shall be as given in UBPPA UNI-B-6. Make calculations in accordance with the Appendix to UBPPA UNI-B-6.

END OF SECTION 33 30 00

APPENDIX A

GEOTECHNICAL ENGINEERING REPORT

GEOTECHNICAL ENGINEERING REPORT



Destin Elementary School Additions

Destin, Okaloosa County, Florida

PREPARED FOR:

Heffernan Holland Morgan Architecture

312 South Alcaniz Street

Pensacola, Florida 32502

NOVA Project Number: 10116-2024070

March 28, 2024

NOVA

PROFESSIONAL | PRACTICAL | PROVEN

March 28, 2024

Robert Heffernan – Vice President
Heffernan Holland Morgan Architecture
312 South Alcaniz Street
Pensacola, Florida 32502

Subject: **Geotechnical Engineering Report**
DESTIN ELEMENTARY SCHOOL ADDITIONS
Destin, Okaloosa County, Florida
NOVA Project Number 10116-2024070

Dear Mr. Heffernan:

NOVA Engineering and Environmental, LLC (NOVA) has completed the authorized Geotechnical Engineering Report for the proposed additions to the existing Destin Elementary School campus in Destin, Florida. The work was performed in general accordance with NOVA Proposal Number 10116-2024070, dated February 20, 2024. This report briefly discusses our understanding of the project at the time of the subsurface exploration, describes the geotechnical consulting services provided by NOVA, and presents our findings, conclusions, and recommendations.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
NOVA Engineering and Environmental LLC

Nicholas P. Turan
Project Engineer

Copies Submitted: Addressee (electronic)

TABLE OF CONTENTS

1.0 INTRODUCTION

This section provides information relating to our contract, the purpose of our work, and a summary of our understanding of the project,

1.1 NAME AND LOCATION OF PROJECT

Destin Elementary School is located at 630 Kelly Street in Destin, Florida. The location of the site is indicated on the Site Location Map included in Appendix A.

1.2 AUTHORIZATION AND SCOPE OF STUDY

Our work on this project was as described in our Proposal Number 10116-2024070 dated February 20, 2024. The primary objectives of this work were to perform a geotechnical exploration within the proposed building footprints and SMS basin, and to assess these findings as they relate to geotechnical aspects of the planned site development. The authorized geotechnical engineering services included a site reconnaissance, soil test borings and sampling, engineering evaluation of the field and laboratory data, and the preparation of this report. As authorized per the above referenced proposal, this completed geotechnical report includes:

- A description of the site, fieldwork, laboratory testing and general soil conditions encountered, as well as a Boring Location Plan and individual Test Boring Records.
- Site preparation considerations that include geotechnical discussions regarding site stripping and subgrade preparation and engineered fill/backfill placement.
- Recommendations for controlling groundwater and/or run-off during construction, and the potential need for a permanent dewatering system based on the anticipated post construction groundwater levels.
- Shallow foundation system recommendations for the proposed structures.
- Slabs-on-grade construction considerations based on the geotechnical findings, including the need for sub-slab vapor barriers or capillary barriers.
- Suitability of on-site soils for re-use as structural fill and backfill. Additionally, the criteria for suitable fill materials will be provided.
- SMS design parameters per NWFWMD ERP requirements.
- Recommended quality control measures (i.e., sampling, testing, and inspection requirements) for site grading and foundation construction.

The assessment of the presence of wetlands, floodplains, or water classified as state waters was beyond the scope of this exploration. Additionally, the assessment of site environmental conditions, including the detection of pollutants in the soil, rock, or groundwater, at the site was also beyond the scope of this geotechnical exploration and evaluation.

2.0 PROJECT INFORMATION

Our understanding of this project is based on discussions with the Client, review of the provided site plans, a site reconnaissance during boring layout, and our experience with similar projects.

2.1 PROJECT SITE

At the time of our field visit, the existing campus consisted of multiple slab-on-grade structures, multiple portable structures, a playground, and a baseball field as well as both asphalt paved and unpaved entrance drives and parking areas. Undeveloped areas across the site were vegetated with short grasses and isolated mature trees.

2.2 PROPOSED DEVELOPMENT

NOVA understands that the planned campus expansion will include constructing new two-story classroom and single-story office buildings as well as a Stormwater Management System (SMS) to treat and dispose of stormwater runoff attributed to the new buildings that will most likely consist of a dry stormwater retention pond or a shallow perimeter swale.

Maximium Loads

We understand that the slab-on-grade structures will be supported by shallow foundation systems. Final structural loadings were not available from the design team at the time of the issuance of this report. We have therefore assumed that maximum loadings for the proposed buildings will not exceed 100 kips per column for isolated interior columns and 6 kips per lineal foot for continuous load bearing walls.

Site Grading

Final grading details were not available from the design team at the time of the issuance of this report; we have therefore assumed that finish site grades will not change greater than +/- 2 feet from existing grades within the proposed structure footprints, and that the SMS basin will be between 2 feet to 5 feet in depth.

3.0 SUBSURFACE EXPLORATION

3.1 AREA GEOLOGY

The site is located in the Okaloosa County, Florida area and according to the United States Geological Survey (USGS), is situated within the greater Gulf Coastal Plain region. The site is generally covered with Alluvium sediments of the Pleistocene/Holocene periods underlain by the Citronelle formation of the Pliocene/Pleistocene periods. The alluvial sediments typically consist of siliciclastics that are fine to coarse quartz sand containing clay lenses and gravel in places. Sands consists primarily of very fine to very coarse poorly sorted quartz grains; gravel is composed of quartz, quartzite, and chert pebbles. In areas of the Valley and Ridge province gravels are generally composed of angular to sub-rounded chert, quartz, and quartzite pebbles. Coastal deposits in the south Okaloosa County area include fine to medium quartz sand with shell fragments and accessory heavy minerals along Gulf beaches and fine to medium quartz sand, silt, clay, peat, mud and ooze in the Mississippi Sound, Little Lagoon, bays, lakes, streams, and estuaries. The Citronelle formation consists primarily of varicolored/mottled lenticular beds of poorly sorted sand, clayey sand, clay, and clayey gravel. Limonite pebbles and lenses of limonite cemented sand occur locally in weathered Miocene exposures.

Surficial soils in the region are primarily siliciclastic sediments deposited in response to the renewed uplift and erosion in the Appalachian highlands to the north and sea-level fluctuations. The extent and type of deposit is influenced by numerous factors, including mineral composition of the parent rock and meteorological events.

3.2 FIELD EXPLORATION

Our field exploration was conducted between the dates of March 15 and March 21, 2024, and included performing:

- Sixteen 30-foot deep SPT borings within the proposed structure footprints.
- Four auger borings within the proposed SMS basin, extended to depths of about 12 feet to 13 feet BEG where the boreholes collapsed due to the presence of groundwater.

The boring locations were established in the field by NOVA personnel using a handheld GPS device and estimating distances and angles from site landmarks. Prior to initiating field testing, underground utilities were marked by Sunshine 811. Underground utility related adjustments of the test locations were made at the time of the field exploration. The approximate test locations are shown on Figure 1 in Appendix B. If increased accuracy is desired by the client, the boring locations and elevations may be surveyed.

The Test Boring Records in Appendix B show the Standard Penetration Test (SPT) resistances, or "N-values", for the structure borings and present the soil conditions encountered in all of the borings. These records represent our interpretation of the subsurface conditions based on the field exploration data, visual examination of the split-barrel samples, laboratory test data, and generally accepted geotechnical engineering practices. The stratification lines and depth designations represent approximate boundaries between various subsurface strata. Actual transitions between materials may be gradual. The groundwater levels reported on the Test Boring Records represent measurements made at the completion of each test boring, following a suitable stabilization period. The test borings were subsequently backfilled with soil cuttings from the drilling process for safety concerns.

Structure (SPT) Borings

The test borings were performed using the guidelines of ASTM Designation D-1586, "Penetration Test and Split-Barrel Sampling of Soils". A mud rotary drilling process was used to advance the borings once groundwater was encountered. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance".

SMS (Auger) Borings

The SMS auger borings were performed using the guidelines of ASTM Designation D-1452, "Soil Exploration and Sampling by Auger Borings". A manually advanced 3¼-inch diameter orchard-type auger was utilized with disturbed samples acquired continuously for the full depth of the boring.

Representative portions of soil samples obtained from all borings were placed in sealed containers and transported to our laboratory for further evaluation and laboratory testing.

3.3 LABORATORY TESTING

Following completion of the field work, soil samples obtained in the field were returned to our office for classification and laboratory testing assignment. These tests included the following:

- Manual/Visual Soil Classification
- Moisture Content
- Fines Content (minus the #200 sieve)
- Falling Head Permeability

The purpose of the testing program was to classify the subsurface materials relative to the Unified Classification System and to determine their physical characteristics including strength, and compressibility. Detailed descriptions of the tests conducted are presented in Appendix C. The soil samples will be discarded 30 days following the submittal of this report, unless you request otherwise.

3.4 SUBSURFACE CONDITIONS

The following paragraphs provide generalized descriptions of the subsurface profiles and soil conditions encountered by the borings conducted during this exploration.

Native Soils

Beneath either up to 6 inches of topsoil or up to 2 feet of an orange fine-grained silty sand fill material (USCS classification of SM, associated with the existing baseball field that will be removed as part of this project), the test borings generally encountered very loose to very dense fine-grained sands (SP) to the maximum depth explored of about 30 feet BEG.

Groundwater Conditions

Groundwater in the Gulf Coastal Plain typically occurs as an unconfined aquifer condition. Recharge is provided by the infiltration of rainfall and surface water through the soil overburden. More permeable zones in the soil matrix can affect groundwater conditions. The groundwater table is expected to be a subdued replica of the original surface topography. Based on a review of topographic maps and our visual site observations, we anticipate the groundwater flow at the site to be towards the south.

Groundwater levels vary with changes in season and rainfall, construction activity, surface water runoff and other site-specific factors. Groundwater levels in the south Okaloosa County area are typically lowest in the late fall to winter and highest in the early spring to mid-summer with annual groundwater fluctuations by seasonal rainfall; consequently, the water table may vary at times.

A stabilized groundwater table was encountered in the test borings at depths varying between about 10½ feet to 12½ feet BEG at the time of our field exploration, which occurred during a period of relatively normal seasonal rainfall.

Based on comparisons of current annual monthly rainfall data to historical rainfall data extending back 50+ years in time, we estimate that the normal permanent seasonal high groundwater (SHGW) table for this site will occur within about 1 foot above the groundwater levels encountered at each boring location, during the wet season.

4.0 GEOTECHNICAL ASSESSMENT

The following assessment is based on our understanding of the proposed construction, our site observations, our evaluation and interpretation of the field data obtained during this exploration, our experience with similar subsurface conditions, and generally accepted geotechnical engineering principles and practices.

Based on the boring results, following site stripping of trees, surficial vegetation, and topsoil as well as any other deleterious materials found to be present, the proposed construction appears to be feasible employing conventional site preparation practices as recommended in the Site Preparation section of this report. We note that the site preparation will include improving the zone of very loose to loose subgrade soils encountered in the upper 8 feet of the SPT borings performed for this project, if the higher allowable soil bearing pressure provided herein is desired for the design of the shallow foundation systems for the proposed structures.

A stabilized groundwater table was encountered at depths varying between about 10½ feet to 12½ feet BEG at the time of our field exploration, which occurred during a period of relatively normal seasonal rainfall. Groundwater is therefore not expected to adversely impact the project.

After the recommended site/subgrade preparation and fill placement has been completed, we recommend that the proposed structures be supported on conventional shallow foundation systems bearing upon compacted native soils or structural fill. The building foundations may be designed employing a maximum soil bearing pressure of **1,500 pounds per square foot (psf),** with an increase to **2,500 psf** if the recommended soil improvement detailed herein is implemented.

With respect to the proposed SMS basin, the subsurface profile identified in the SMS borings performed for this project appears to be well suited for the planned stormwater retention pond or shallow swale system.

We note that subsurface conditions in unexplored locations may be different from those encountered at the boring locations considered and discussed herein. If such variations are noted during construction, or if project development plans are changed, we request the opportunity to review the changes and amend our recommendations, if necessary.

The following sections present our recommendations for site preparation and grading, and for the design of the shallow foundation systems and the pavement sections.

5.0 RECOMMENDATIONS

5.1 SITE PREPARATION

We recommend removing any remaining surficial vegetation and topsoil as well as any other deleterious non-soil materials that are found to be present, including any ancillary structures or substructures that are currently located within the proposed building footprints. The soils exposed at the stripped grade elevation, as well as subsequent fill lifts and footing excavations, should be compacted using a large ride-on roller operating in the static mode to a minimum soil density of at least 98 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557). We note that vibratory compaction operations should not be performed for this project given the presence of abutting structures within the existing school campus, and significant water will need to be introduced into the very high permeability subgrades immediately prior to commencing with compaction.

The SPT borings encountered very loose to loose soil conditions (N-values of concern varying between 2 and 6) in the upper 8 feet of the soil horizon that could potentially require improvement (depending on the desired design soil bearing pressure) to provide adequate support of the planned structures. This improvement can typically be accomplished by compacting the soils exposed at the stripped grade elevation using a heavy weight vibratory roller (i.e., a minimum 10-ton drum roller, static weight, with a minimum 5-foot drum diameter), but as noted above vibratory compaction operations are not recommended for this site given the close proximity of existing structures.

Therefore, to provide an increased soil bearing pressure from 1,500 pounds per square foot to 2,500 pounds per square foot (if desired), the subgrade soils present beneath and extending to a minimum distance of 3 feet outside the perimeters of the proposed building footprints should be undercut to a depth of 4 feet below current grade elevations. The soils exposed at that elevation should be compacted using a large drum roller (operating in the static mode) to a minimum soil density of at least 100 percent of the Modified Proctor maximum dry density, and the excavation should then be backfilled in maximum 12-inch (loose thickness) lifts also compacted to at least 100 percent. Subsequent footing excavations should be compacted to 98 percent. We note that the undercut soils (excluding any topsoil) should be suitable for re-use as backfill material.

A geotechnical engineer should carefully evaluate all subgrades prior to foundation and slab-on-grade construction to confirm compliance with this report; evaluate geotechnical sections of the plans and specifications for the overall project; and provide additional recommendations that may be required.

5.2 EXCAVATION

Excavations greater than five feet deep (such as for deeper foundations and underground utilities) should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29CFR Part 1926), excavation safety standards. It should be noted that the Contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should NOVA be assumed to be responsible for construction site safety. Each excavation should be observed and classified by an OSHA-competent person. All excavations below the groundwater level are classified as OSHA Class C soils for excavation purposes.

After stripping and trench excavation, a NOVA geotechnical engineer should carefully evaluate the exposed soils. We recommend undercutting the proposed pipe trench areas approximately ½ foot below the proposed pipe bearing elevations and installing structural backfill for use as pipe bedding materials. Sewer pipe installation should be constructed in general compliance with ASTM D 2321, standard practice for underground installation of pipe for sewers and other gravity flow applications.

Groundwater Control

A stabilized groundwater table was encountered in the test borings at depths varying between about 10½ feet to 12½ feet BEG at the time of our field exploration, which occurred during a period of relatively normal seasonal rainfall. Groundwater is therefore not anticipated to adversely impact this project.

As previously noted, groundwater levels are subject to seasonal, climatic and other variations and may be different at other times and locations.

5.3 FILL PLACEMENT

Fill Suitability

Fill materials should be relatively clean sands with less than 12 percent fines (material passing the No. 200 sieve), and free of non-soil materials and rock fragments larger than 3 inches in diameter. The majority of the on-site near surface soils (excluding the orange fine-grained silty sand fill material being used for the baseball field) can be categorized as SP, or fine-grained sands based on the Unified Soil Classification System (USCS). This sandy soil type is considered suitable for re-use as structural fill/backfill within the proposed building footprint; however, care should be taken to maintain strict moisture control during placement. We recommend that the existing orange baseball diamond material be blended with the underlying native sands to produce a more moisture-tolerant composite material, or it should be removed from the site if excavated due to its inherent moisture sensitivity.

All materials to be used for backfill or compacted fill construction should be evaluated and, if necessary, tested by NOVA prior to placement to determine if they are suitable for their intended use. In general, based upon the boring results, the near surface sands such as those encountered in the borings can be used as structural fill as well as general subgrade fill and backfill, provided that the material is free of rubble, clay, rock, roots and organics, and is within +/- 3% of its optimum moisture content at the time of placement. Any off-site materials used as fill should be approved by NOVA prior to acquisition.

Organic and/or debris-laden material is not suitable for re-use as structural fill. Topsoil, mulch, and similar organic materials can be wasted in architectural areas. Debris-laden materials should be excavated, transported, and disposed of off-site in accordance with appropriate solid waste rules and regulations.

Soil Compaction

Fill should be placed in thin, horizontal loose lifts (maximum 12-inch) and compacted via non-vibratory methods to a minimum soil density of at least 98 percent of the Modified Proctor maximum dry density (ASTM D-1557), or to at least 100 percent if the undercutting and backfilling alternative described above is implemented. The upper 12 inches of soil beneath the bottoms of all foundation footing excavations should be compacted to at least 98 percent. In confined areas, such as utility trenches or behind retaining walls, portable compaction equipment and thinner fill lifts (3 to 4 inches) may be necessary.

Fill materials used in structure areas should have a target maximum dry density of at least 95 pounds per cubic foot (pcf). If lighter weight fill materials are used, the NOVA geotechnical engineer should be consulted to assess the impact on design recommendations.

Soil moisture content should be maintained within 3 percent of the optimum moisture content. We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. Moisture control may be difficult during rainy weather.

Filling operations should be observed by a NOVA soils technician, who can confirm suitability of material used and uniformity and appropriateness of compaction efforts. The technician can also document compliance with the specifications by performing field density tests using thin-walled tube, nuclear, or sand cone testing methods (ASTM D-2937, D-6938, or D-1556, respectively). One test per 2,500 square feet of building footprint should be performed within the proposed structure areas at the stripped grade elevation and in each lift of fill, with test locations well distributed throughout the fill mass. One test in each column footing and one test per 50 linear feet of continuous strip foundations are also recommended.

5.4 FOUNDATIONS

General

NOVA understands that the planned campus expansion will include constructing new two-story classroom and single-story office buildings that will be supported by conventional shallow foundation systems. Final structural loadings were not available from the design team at the time of the issuance of this report. We have therefore assumed that maximum loadings for the proposed buildings will not exceed 100 kips per column for isolated interior columns and 6 kips per lineal foot for continuous load bearing walls.

If any of the above stated design assumptions are found to be incorrect or are revised, NOVA should be contacted immediately so that additional analyses can be performed to determine if the recommendations presented herein will need to be modified.

Shallow Foundation Systems

Design: After the recommended site/subgrade preparation and fill placement, we recommend that the proposed structures be supported on conventional shallow foundation systems bearing upon compacted native soils and/or compacted structural fill. As noted above, the building foundations may be designed employing a maximum allowable soil bearing pressure of **1,500 pounds per square foot (psf) with conventional site preparation practices (provided a larger ride-on roller operating in the static mode is used to compact the exposed subgrade soils and subsequent fill lifts as recommended herein), with an increase to 2,500 psf with employment of the undercutting and backfilling recommended above**.

We recommend a value of 0.35 can be employed as the coefficient of friction (sliding resistance) between foundations and the underlying residual or fill soils. Footings should be a minimum of 24 inches in width for ease of construction and to reduce the possibility of localized shear failures. Isolated exterior and interior footing bottoms should be established at least 18 inches below finished surrounding exterior grades. When utilizing a post-tensioned monolithic slab-on-grade design, exterior and interior footing bottoms should be established a minimum of 12 inches below adjacent finished grades.

Settlement: Settlements for spread foundation bearings on structural fill were assessed using SPT values to estimate elastic modulus, based on published correlations and previous NOVA experience. We note that the settlements presented are based on the SPT boring results. Conditions may be better or worse in other areas; however, we believe the estimated settlements are reasonably conservative.

Based on the provided structural loadings, the soil bearing capacity provided above, the presumed foundation elevations as discussed above, we expect residual primary total settlement beneath individual foundations to be on the order of 1 inch.

The amount of differential settlement is difficult to predict because the subsurface and foundation loading conditions can vary considerably across the site. However, we anticipate residual differential settlement between adjacent foundations will be less than ½ inch. The final deflected shape of the structure will be dependent on actual foundation locations and loading.

Foundation support conditions are highly erratic and may vary dramatically in short horizontal distances. It is anticipated that the geotechnical engineer may recommend a different bearing capacity upon examination of the actual foundation subgrade at numerous locations.

To reduce the differential settlement if lower consistency materials are encountered, a lower bearing capacity should be used. We anticipate that timely communication between the geotechnical engineer and the structural engineer, as well as other design and construction team members, will be required.

Construction: Foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen, or water-softened soils. Concrete should be placed as soon as is practical after the foundation is excavated and the subgrade evaluated. Foundation concrete should not be placed on frozen or saturated soil.

If a foundation excavation remains open overnight, or if rain or snow is imminent, a 3 to 4-inch thick "mud mat" of lean concrete should be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

5.5 SLABS-ON-GRADE

General

The conditions exposed at subgrade levels will vary across the site and may include structural fill. The slabs-on-grade may be adequately supported on these subgrade conditions subject to the recommendations in this report. The slabs-on-grade should be jointed around columns and along walls to reduce cracking due to differential movement. Underdrain systems are not necessary beneath the slabs, provided that the slabs are established at least 2 feet above the SHGW level.

Once grading is completed, the subgrade is usually exposed to adverse construction activities and weather conditions during periods of sub-slab utility installations. The subgrade should be well-drained to prevent the accumulation of water. If the exposed subgrade becomes saturated or frozen, the geotechnical engineer should be consulted.

After utilities have been installed and backfilled, a final subgrade evaluation should be performed by the geotechnical engineer immediately prior to each slab-on-grade placement. If practical, proofrolling may be used to redensify the surface and to detect any soil that has become excessively wet or otherwise loosened.

Subgrade Modulus

A coefficient of subgrade reaction (***k***) of 125 pci (psi per inch) may be used for conventional slab design where slabs bear upon subgrades prepared in accordance with previous recommendations.

Please note that this magnitude of ***k*** is intended to reflect the elastic response of soil beneath a typical floor slab under light loads with a small load contact area often measured in square inches, such as loads from forklifts, automobile/truck traffic or lightly loaded storage racks. The recommended coefficient of subgrade reaction (***k***) of 125 pci is not applicable for heavy slab loads caused by bulk storage or tall storage racks, or for mat foundation design.

Several design methods are applicable for conventional slab design. We have assumed that the slab designer will utilize the methods discussed in the American Concrete Institute (ACI) Committee 360 report, *"Guide to Design of Slabs-on-Ground, (ACI 360R-10)*.

5.6 STORMWATER MANAGEMENT SYSTEM

We understand that the project is desired to employ a shallow dry retention basin or possibly a shallow perimeter swale system to treat and dispose of stormwater runoff associated with the planned campus additions. Based on the results of the test borings, the subsurface conditions encountered beneath the proposed SMS basin appear to be adaptable for employing either of these SMS concepts.

SMS soil design parameters are provided in the table on the next page for use in the design of a conventional shallow SMS basin.

SMS Soil Design Parameters for Shallow Retention Basin		
Corresponding Soil Boring Test Location	R-1 – R-4, B-8	
Approximate Depth of Sample Tested	0-5 feet	5-14 feet
Approximate Depth to Confining Stratum, BEG	15 feet	
Measured Vertical Hydraulic Conductivity at Basin Bottom (Kv)	30 feet/day	38 feet/day
Calculated Horizontal Hydraulic Conductivity at Basin Bottom (Kh)	46 feet/day	56 feet/day
Estimated Infiltration Rate at Basin Bottom, DRI	10 inches/hour	12 inches/hour
Estimated Fillable Porosity of Soil	25%	
Estimated Depth to Normal Permanent SHGW table, BEG	10 feet	

We note that the actual exfiltration rate from the basin bottom may be influenced by basin geometry, natural soil variability, in-situ depositional characteristics and soil density, retention volume, and groundwater mounding effects. Appropriate factors of safety should be incorporated into the design process.

We note that NOVA performs remolded laboratory permeability testing using generally accepted practices of the local engineering community. These types of tests are the quickest and most economical for stormwater retention basin design. However, the user of this information is cautioned that the potential variability of results of these types of tests can be significant, and the reproducibility of results can vary by factors of up to 100 percent.

Also, the permeability measured by such tests may not be representative of the total effective aquifer thickness. Factors of safety can compensate for part of the inherent test limitations, but the designer must exercise judgment regarding final selection and applicability of provided soil design input parameters. Should the modeling analysis indicate marginally acceptable compliance with Water Management District design criteria, it may be advisable to perform more extensive and representative in-situ permeability testing by collecting “undisturbed” horizontal and vertical soil samples and/or installing grouted piezometers or wells for slug testing. NOVA can perform these field tests if desired.

6.0 LIMITATIONS

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at significantly later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study and our experience. If additional information becomes available that might impact our geotechnical opinions, it will be necessary for NOVA to review the information, reassess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between test locations will differ from those encountered at specific test locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process have altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

This report is intended for the sole use of **Heffernan Holland Morgan Architecture** for the above noted project. The scope of work performed during this study may not satisfy other user's requirements. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. NOVA is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

Our professional services have been performed, our findings obtained, our conclusions derived and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the State of Florida. This warranty is in lieu of all other statements or warranties, either expressed or implied.

LABORATORY TESTING

A laboratory testing program was conducted to characterize materials which exist at the site using the recovered samples. Selected test data are presented on the Test Boring Records attached in the Appendix. The specific tests are briefly described below. All soil samples will be properly disposed of 30 days following the submittal of this NOVA subsurface exploration report unless you request otherwise.

SOIL CLASSIFICATION

Soil classification provides a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our explorations, samples obtained during drilling operations are observed in our laboratory and visually classified by an engineer. The soils are classified according to consistency, color and texture. These classification descriptions are included on our Test Boring Records. The classification system discussed above is primarily qualitative; laboratory testing is generally performed for detailed soil classification. Using the test results, the soils were classified using the Unified Soil Classification System. This classification system and the in-place physical soil properties provide an index for estimating the soil's behavior.

MOISTURE CONTENT

The moisture content is the ratio expressed as a percentage of the weight of water in a given mass of soil to the weight of the solid particles and was conducted in general accordance with ASTM D-2216.

PERCENT FINES

The percent fines is defined as the percentage of the total dry soil mass which passes a #200 sieve. This test was conducted in general accordance with ASTM D-1140.

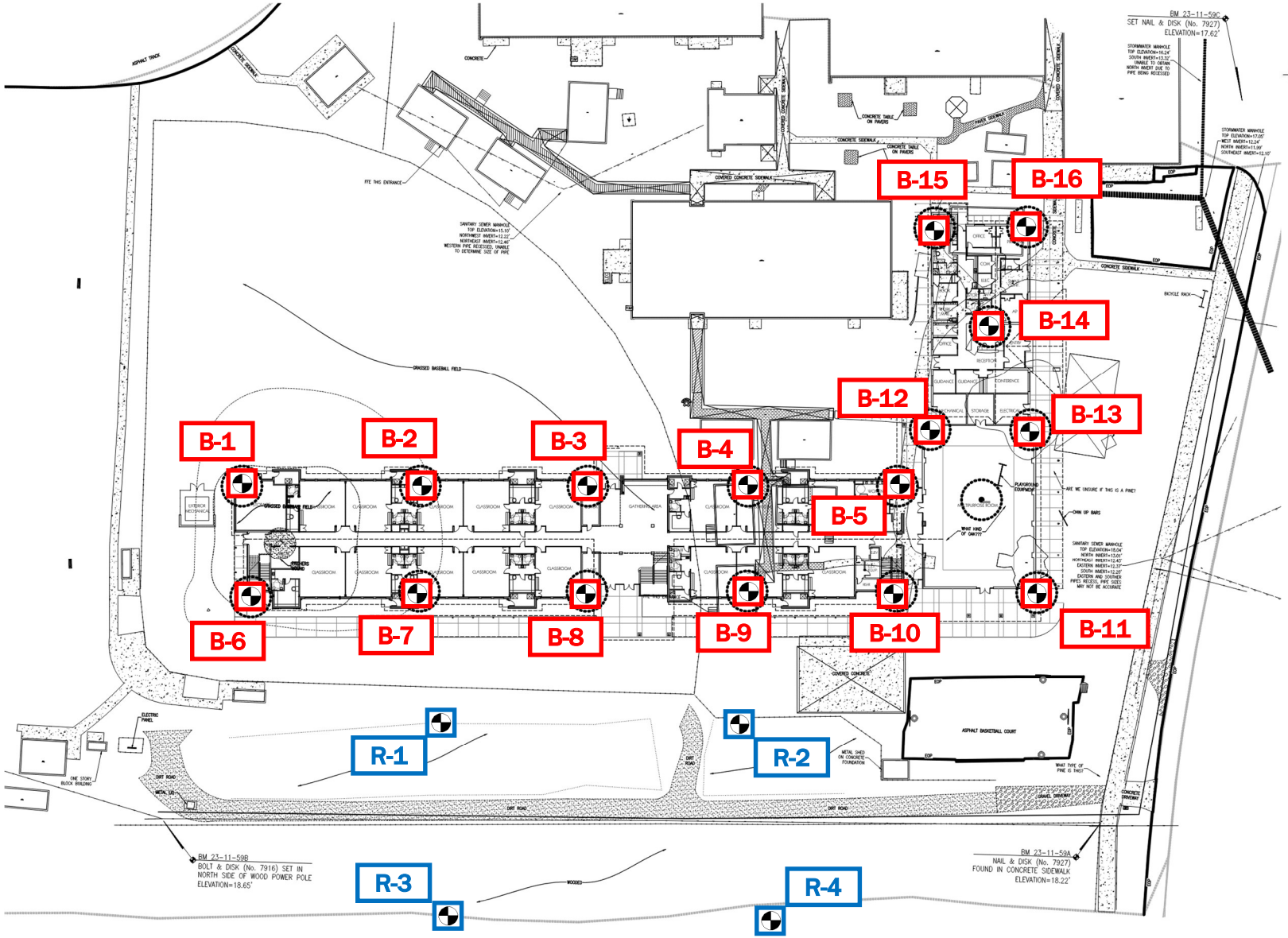
FALLING HEAD PERMEABILITY TEST

A remolded falling head permeability test (ASTM D-5084) is a common laboratory test used to determine the hydraulic conductivity of fine-grained soils. The test involves the flow of water through a re-molded, fully saturated soil sample inside a rigid-wall permeameter connected to a standpipe of constant diameter. Before beginning the flow measurements, the soil sample is saturated and the standpipe is filled with water to a given level. The test then starts by allowing the water to flow through the sample until the water in the standpipe reaches a lower limit. The time required for the water to flow from the upper to lower limit is recorded.

APPENDIX A
Figures and Maps

Scale: Not To Scale **Date Drawn:** March 8, 2024 **Drawn By:** N. Turan **Checked By:** W. Lawrence	NOVA 5001 Commerce Park Circle Pensacola, Florida 32505 850.607.7782 ♦ 850.249.6683	**PROJECT LOCATION MAP** **Destin Elementary Addition** Destin, Okaloosa County, Florida *NOVA Project Number 10116-2024070*

APPENDIX B
Subsurface Data



LEGEND

B-x = 30-ft. Structural SPT Boring

R-x = 15-ft. SMS Auger Boring

Scale: Not To Scale	NOVA	**BORING LOCATION PLAN**
Date Drawn: March 8, 2024	5001 Commerce Park Circle Pensacola, Florida 32505 850.607.7782 ♦ 850.249.6683	**Destin Elementary Addition** Destin, Okaloosa County, Florida *NOVA Project Number 10116-2024070*
Drawn By: N. Turan		
Checked By: W. Lawrence		

KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
% REC	Percent Core Recovery from Rock Core Drilling
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diamicaceous fine sands or silts, elastic silts
			CH	Inorganic clays or clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
			PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Medium Stiff – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

NOVA

TEST BORING RECORD B-1

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 10.5 ft. AFTER 24 HOURS: ▽ _____ CAVING> C _____

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0						
		TOPSOIL (Approx. 3 inches)				8
		Orange loose fine-grained silty SAND (SM)				12
		Light brown loose to medium dense fine-grained SAND (SP)				6
5						8
		Off-white loose to dense fine-grained SAND (SP)				12
10				▽		
						21
15						
						31
20						
						34
25						
						41
30		Boring Terminated at 30 ft.				
35						

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-2

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 20, 2024
DEPTH TO - WATER> INITIAL: ▽ 10.5 ft. AFTER 24 HOURS: ▼ _____ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0						
		Orange loose fine-grained silty SAND (SM)				8
		Light brown loose to very loose fine-grained SAND (SP)				3
5						3
						6
		Off-white loose to dense fine-grained SAND (SP)				7
10				▽		
						25
15						
						35
20						
						35
25						
						37
30		Boring Terminated at 30 ft.				
35						

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-3

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 10.5 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0						
		TOPSOIL (Approx. 3 inches)				4
		Light brown loose fine-grained SAND (SP)				6
5						4
		Off-white loose to dense fine-grained SAND (SP)				7
						9
10				▽		
						26
15						
						30
20						
						42
25						
						44
30		Boring Terminated at 30 ft.				
35						

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

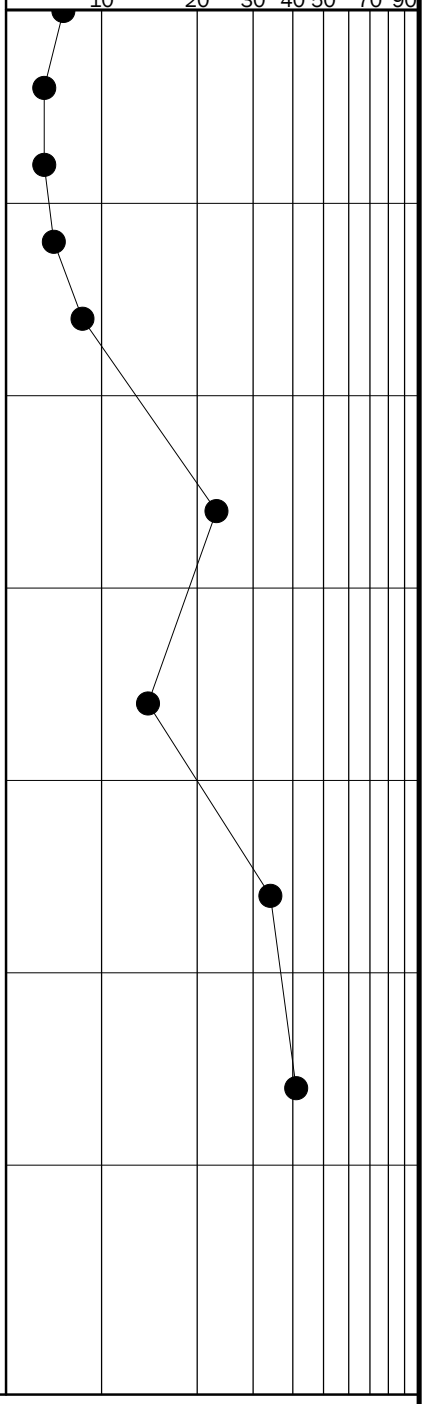
NOVA

TEST BORING RECORD B-4

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 10.5 ft. AFTER 24 HOURS: ▼ ____ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0						
		TOPSOIL (Approx. 3 inches)				6
		Light brown loose fine-grained SAND (SP)				4
						4
5						5
		Off-white loose to dense fine-grained SAND (SP)				8
10				▽		
						23
15						
						14
20						
						34
25						
						41
30		Boring Terminated at 30 ft.				
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT



This information pertains only to this boring and should not be interpreted as being indicative of the site.

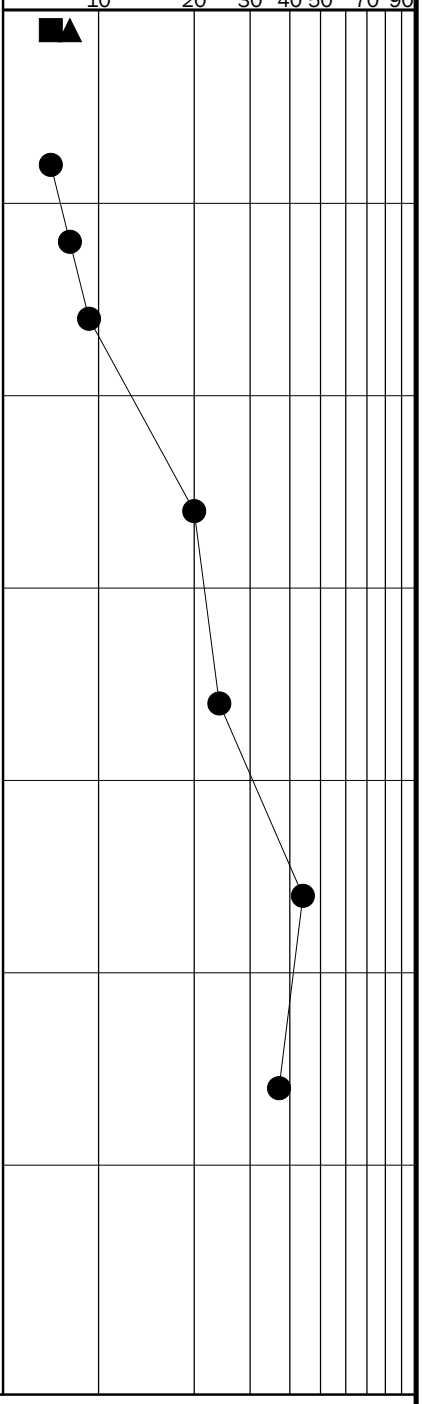
NOVA

TEST BORING RECORD B-5

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 21, 2024
DEPTH TO - WATER> INITIAL: ▽ 11.5 ft. AFTER 24 HOURS: ▽ _____ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		Orange fine-grained silty SAND (SM)				
		Light brown fine-grained SAND (SP)				
5		Off-white loose to dense fine-grained SAND (SP)				5, 7, 9
10				▽		20
15						
20						24
25						44
30		Boring Terminated at 30 ft.				37
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90



This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOTE: Hand augered to 4 ft. BEG due to proximity of utilities.

NOVA

TEST BORING RECORD B-6

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 10.5 ft. AFTER 24 HOURS: ▽ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0						
		Orange loose fine-grained silty SAND (SM)				6
		Light brown loose fine-grained SAND (SP)				5
5						4
		Off-white loose to dense fine-grained SAND (SP)				4
						9
10				▽		
						47
15						
						36
20						
						31
25						
		Off-white/light brown very dense fine-grained SAND (SP)				52
30		Boring Terminated at 30 ft.				
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

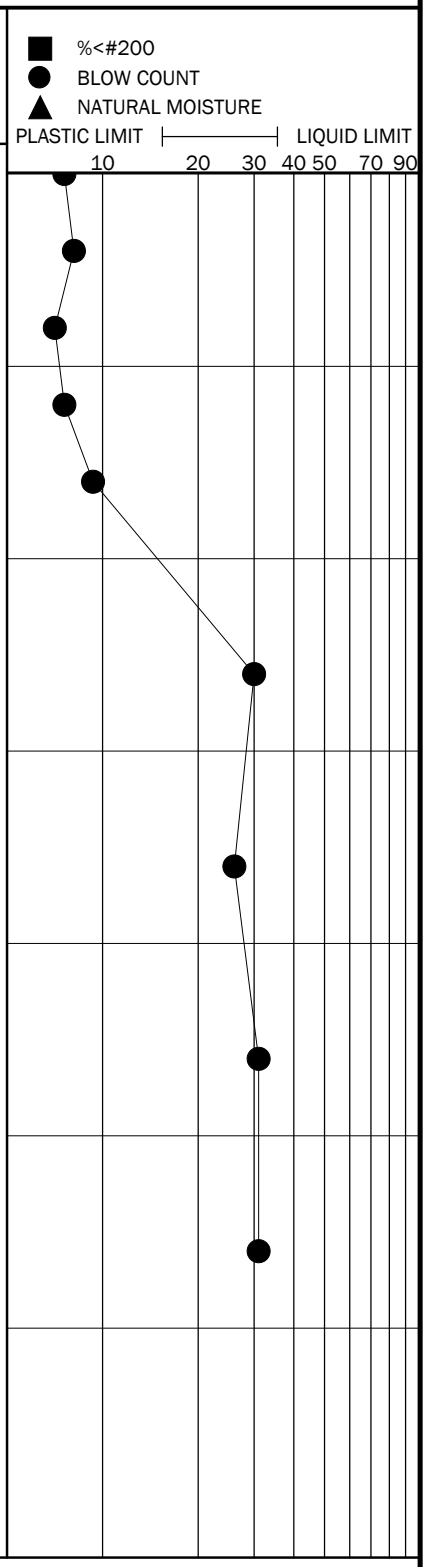
This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-7

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 10.75 ft. AFTER 24 HOURS: ▼ _____ CAVING> C

Depth (feet)	Description	N-Value
0		
	Orange loose fine-grained silty SAND (SM)	6
	Light brown loose fine-grained SAND (SP)	7
5	Off-white loose to dense fine-grained SAND (SP)	5
		6
		9
10		
		30
15		
		26
20		
		31
25		
		31
30	Boring Terminated at 30 ft.	
35		



This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-8

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 10.75 ft. AFTER 24 HOURS: ▼ _____ CAVING> C

Depth (feet)	Description	N-Value
0	TOPSOIL (Approx. 6 inches)	
	Light brown loose fine-grained SAND (SP)	6
		5
5	Off-white loose to dense fine-grained SAND (SP)	6
		7
		7
10		
		30
15		
		14
20		
		16
25		
		35
30	Boring Terminated at 30 ft.	
35		

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

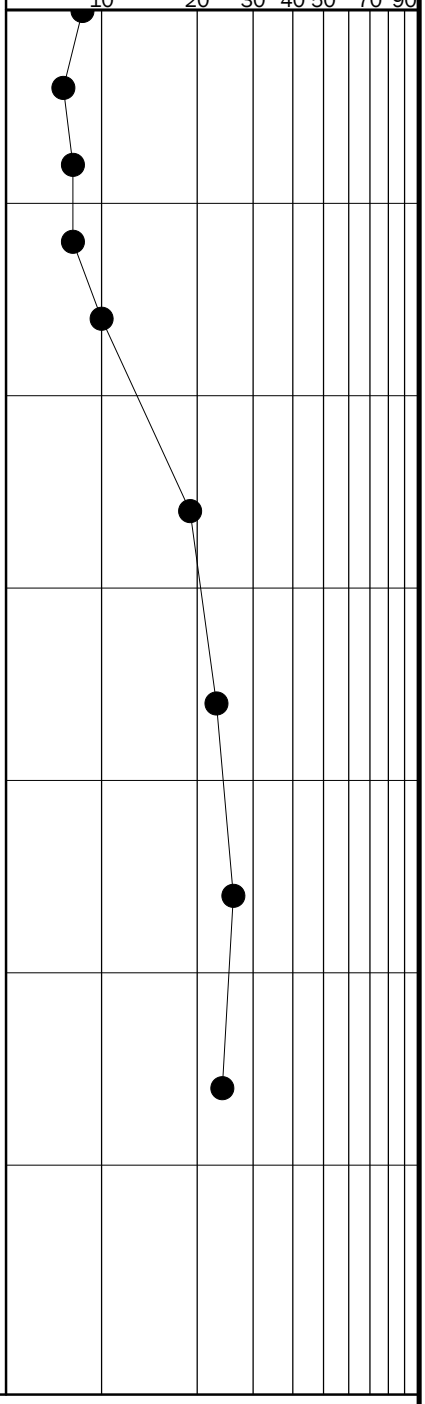
TEST BORING RECORD B-9

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 20, 2024
DEPTH TO - WATER> INITIAL: ▽ 11.25 ft. AFTER 24 HOURS: ▽ _____ CAVING> C _____

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0						
		Brown/orange loose fine-grained silty SAND (SM)				8
		Light brown loose fine-grained SAND (SP)				6
5		Off-white loose to medium dense fine-grained SAND (SP)				7
						7
						10
10				▽		
						19
15						
						23
20						
						26
25						
						24
30		Boring Terminated at 30 ft.				
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT

10 20 30 40 50 70 90



This information pertains only to this boring and should not be interpreted as being indicative of the site.

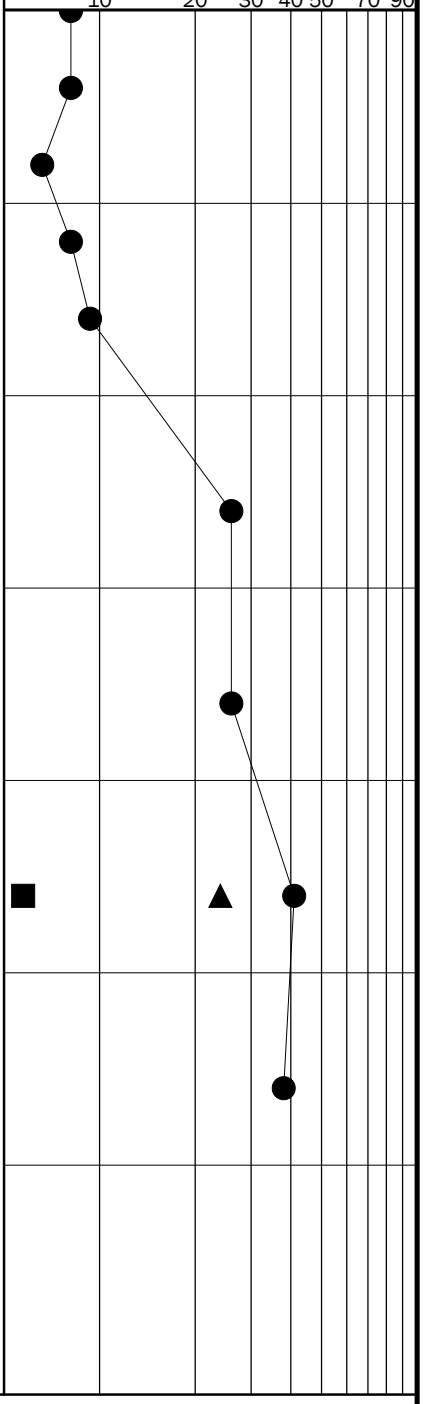
NOVA

TEST BORING RECORD B-10

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 20, 2024
DEPTH TO - WATER> INITIAL: ▽ 11.5 ft. AFTER 24 HOURS: ▽ _____ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0						
		Orange loose fine-grained silty SAND (SM)				7
		Light brown loose fine-grained SAND (SP)				7
5						4
						7
		Off-white loose to dense fine-grained SAND (SP)				9
10				▽		
						26
15						
						26
20						
						41
25						
						38
30		Boring Terminated at 30 ft.				
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT



This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-11

PROJECT: Destin Elementary School Additions
PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan
ELEVATION: Existing Grade
DRILLER: American Drilling Inc.
LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring
DATE: March 20, 2024
DEPTH TO - WATER> INITIAL: ▽ 11.5 ft. AFTER 24 HOURS: ▼ _____ CAVING> C

Depth (feet)	Description	N-Value
0		
	Orange/gray loose fine-grained silty SAND (SM)	7
	Light brown loose fine-grained SAND (SP)	4
5		4
	Off-white loose to dense fine-grained SAND (SP)	4
		9
10		
		24
15		
		22
20		
		29
25		
		39
30	Boring Terminated at 30 ft.	
35		

Elevation (ft-MSL) | Graphic | Groundwater | Sample Type

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-12

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 20, 2024
DEPTH TO - WATER> INITIAL: ▽ 11.5 ft. AFTER 24 HOURS: ▽ _____ CAVING> C

Depth (feet)	Description	N-Value
0		
	Orange fine-grained silty SAND (SM)	
	Light brown fine-grained SAND (SP)	
5	Off-white very loose to dense fine-grained SAND (SP)	2
		2
		9
10		
		23
15		
		19
20		
		38
25		
		31
30	Boring Terminated at 30 ft.	
35		

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

NOTE: Hand augered to 4 ft. BEG due to proximity of utilities.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-13

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: American Drilling Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 20, 2024
DEPTH TO - WATER> INITIAL: ▽ 11.5 ft. AFTER 24 HOURS: ▼ _____ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0						
		Light brown loose fine-grained SAND (SP)				8
						6
						4
5						
		Off-white loose to dense fine-grained SAND (SP)				5
						9
10				▽		
						25
15						
						25
20						
						40
25						
						37
30		Boring Terminated at 30 ft.				
35						

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

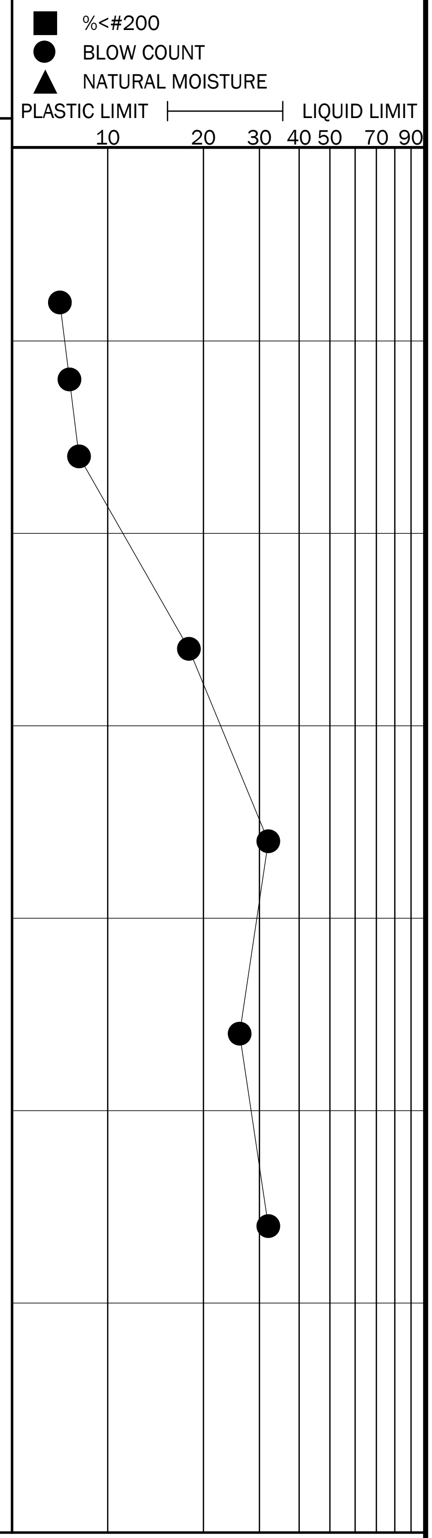
This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-14

PROJECT: Destin Elementary School Additions PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: American Drilling Inc. LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring DATE: March 21, 2024
DEPTH TO - WATER> INITIAL: 11.5 ft. AFTER 24 HOURS: CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		Orange fine-grained silty SAND (SM)				
		Light brown fine-grained SAND (SP)				
4		Off-white loose to dense fine-grained SAND (SP)				5
6						6
8						7
11.5				▽		
13						18
18						32
23						26
28						32
30		Boring Terminated at 30 ft.				



This information pertains only to this boring and should not be interpreted as being indicative of the site.

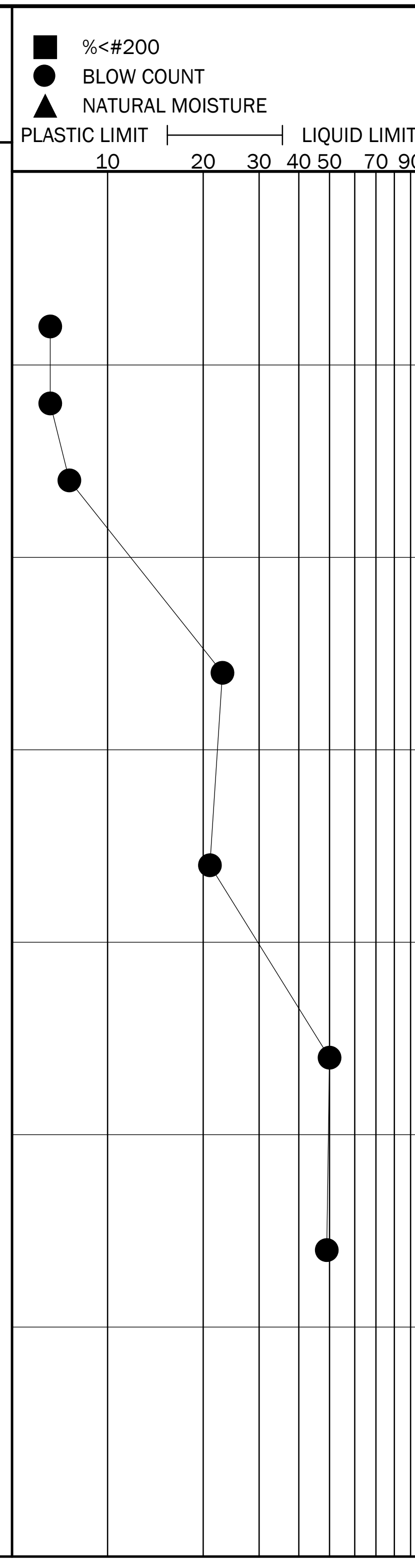
NOTE: Hand augered to 4 ft. BEG due to proximity of utilities.

NOVA

TEST BORING RECORD
B-15

PROJECT: Destin Elementary School Additions	PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture	
PROJECT LOCATION: Destin, Okaloosa County, Florida	
LOCATION: Per Boring Location Plan	ELEVATION: Existing Grade
DRILLER: American Drilling Inc.	LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring	DATE: March 21, 2024
DEPTH TO - WATER> INITIAL: 11.5 ft.	AFTER 24 HOURS: CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 6 inches)				
		Light brown fine-grained SAND (SP)				
4						4
6		Off-white loose to dense fine-grained SAND (SP)				4
8						6
11.5				▽		
13						23
18						21
23						50
28						49
30		Boring Terminated at 30 ft.				



This information pertains only to this boring and should not be interpreted as being indicative of the site.

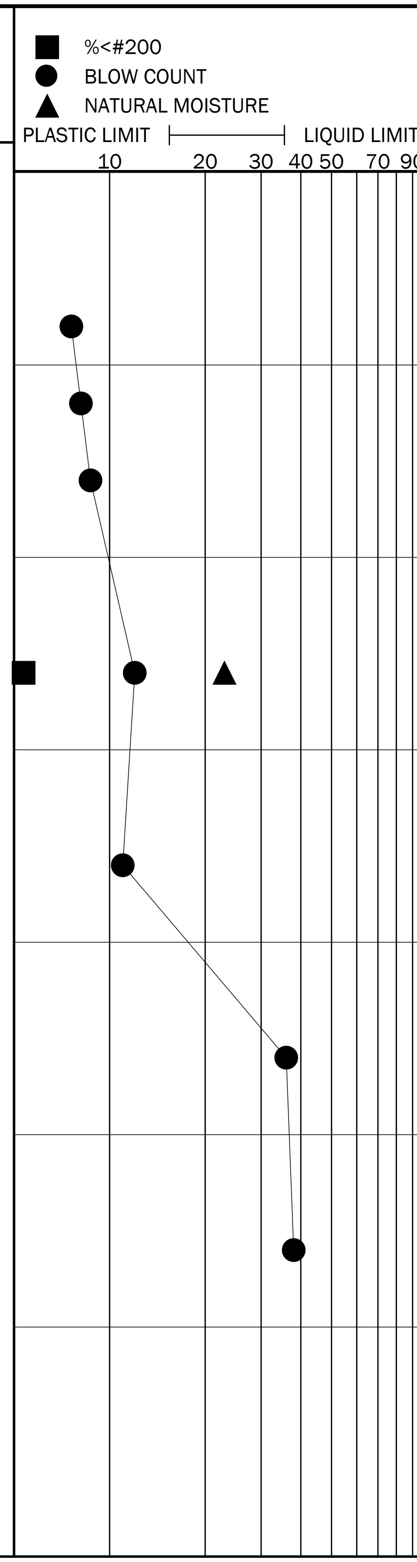
NOTE: Hand augered to 4 ft. BEG due to proximity of utilities.

NOVA

TEST BORING RECORD B-16

PROJECT: Destin Elementary School Additions
PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan
ELEVATION: Existing Grade
DRILLER: American Drilling Inc.
LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring
DATE: March 21, 2024
DEPTH TO - WATER> INITIAL: 11.5 ft. AFTER 24 HOURS: CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Groundwater	N-Value
0–1		Orange loose fine-grained silty SAND (SM)		
1–5		Light brown fine-grained SAND (SP)		6
5–11.5		Off-white loose fine-grained SAND (SP)		7, 8
11.5–17.5		Light gray/off-white medium dense fine-grained SAND (SP)	▽ (11.5 ft)	12
17.5–30		Off-white medium dense to dense fine-grained SAND (SP)		11, 36, 38
30		Boring Terminated at 30 ft.		



This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOTE: Hand augered to 4 ft. BEG due to proximity of utilities.

NOVA

TEST BORING RECORD R-1

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: E. Sharpe | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 11 ft. AFTER 24 HOURS: ▼ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 6 inches)				
		Light brown fine-grained SAND (SP)				
5		Off-white fine-grained SAND (SP)		▽		
10						
		Boring Terminated at 12 ft.				
15						
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD R-2

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: E. Sharpe | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 10.5 ft. AFTER 24 HOURS: ▼ _____ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 6 inches)				
		Light brown fine-grained SAND (SP)				
5		Off-white fine-grained SAND (SP)		▽		
10						
		Boring Terminated at 11.5 ft.				
15						
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD R-3

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: E. Sharpe | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 12.5 ft. AFTER 24 HOURS: ▼ _____ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 6 inches)				
		Light brown fine-grained SAND (SP)				
5		Off-white fine-grained SAND (SP)		▽		
10						
15		Boring Terminated at 13.5 ft.				
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD R-4

PROJECT: Destin Elementary School Additions | PROJECT NO.: 10116-2024070
CLIENT: Heffernan Holland Morgan Architecture
PROJECT LOCATION: Destin, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: E. Sharpe | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: March 15, 2024
DEPTH TO - WATER> INITIAL: ▽ 12 ft. AFTER 24 HOURS: ▽ CAVING> C

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 6 inches)				
		Light brown fine-grained SAND (SP)				
5		Off-white fine-grained SAND (SP)		▽		
10						
15		Boring Terminated at 13 ft.				
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

APPENDIX C
Laboratory Data

SUMMARY OF CLASSIFICATION & INDEX TESTING

Destin Elementary
Destin, Okaloosa County, Florida
NOVA Project Number 10116-2024070

SUMMARY OF CLASSIFICATION AND INDEX TESTING						
Boring No.	Sample Depth (ft. BEG)	Natural Moisture (%)	Percent Fines (- #200)	Hydraulic Conductivity		USCS Soil Classification
				K_{vs} (ft/day)	Unit Weight of Sample (pcf)	
B-1	13-15	22	2	---	---	SP
B-3	4-6	6	5	---	---	SP
B-5	2-4	7	5	---	---	SP
B-6	28-30	24	2	---	---	SP
B-8	23-25	25	2	---	---	SP
B-10	23-25	24	2	---	---	SP
B-11	4-6	5	4	---	---	SP
B-13	8-10	5	1	---	---	SP
B-16	13-15	23	1	---	---	SP
R-2	0.5-5	6	5	30	100	SP
R-4	5-13.5	4	1	38	95	SP

REMOLDED LABORATORY PERMEABILITY TEST DATA SHEET

PROJECT: Destin Elementary **NOVA PROJECT #:** 10116-2024070

DATE: 3/22/2024 **ASSIGNED BY:** JAJ **TESTED BY:** ELHS

Sample LOCATION / BORING NO.	R-2
Sample NUMBER / DEPTH	0.5 ft. - 5 ft.

PERMEABILITY TESTING SUMMARY			
PERMEABILITY (K_V)	→	30	ft/day
Corresponding K_h	→	46	ft/day
DRY DENSITY	→	100	lbs/ft^3
MOISTURE CONTENT	→	6	%
-200 FINES CONTENT	→	5	%

FALLING HEAD PERMEABILITY (ASTM D 5084)

No. of LAYERS:	3	Wt. of MOLD (lbs):	4.48
BLOWS/LAYER:	15	Wt. of MOLD/SOIL (lbs):	8.01

HEIGHT (FT)	TRIAL #1 (SEC)	PERMEABILITY
7	0.0	1.10E-02
6	1.5	1.06E-02
5	3.2	1.04E-02
4	5.3	1.06E-02
3	8.1	1.11E-02
2	11.9	
1	17.7	
	1.1E-02	cm/sec

MOISTURE CONTENT (ASTM D 2216)

Pan NUMBER	N
Wt. of WET SOIL & PAN (g)	201.8
Wt. of DRY SOIL & PAN (g)	193.8
Wt. of PAN (g)	65.8
Wt. of Water (g)	8.0
Wt. of Dry Soil (g)	128.0
MOISTURE CONTENT (%)	6.3

-200 SIEVE WASH (ASTM D 1140)

Pan NUMBER	N
Wt. of DRY SOIL & PAN (g)	193.8
Wt. of WASH SOIL & PAN (g)	187.8
Wt. of PAN (g)	65.8
Wt. of Original Dry Sample (g)	128.0
Wt. of -200 Material (g)	6.0
Wt. of Washed Dry Sample (g)	122.0
-200 FINES CONTENT (%)	4.7

NUMBER OF INCHES MOLD WAS SHORT? 0.000 INCHES (ZERO INCHES IS DEFAULT)

PERMEABILITY CONSTANT USED WAS → 0.23 (Includes 3/8"ID tubing)

NOVA

REMOLDED LABORATORY PERMEABILITY TEST DATA SHEET

PROJECT: Destin Elementary **NOVA PROJECT #:** 10116-2024070

DATE: 3/22/2024 **ASSIGNED BY:** JAJ **TESTED BY:** ELHS

Sample LOCATION / BORING NO.	R-4
Sample NUMBER / DEPTH	5 ft. - 13.5 ft.

PERMEABILITY TESTING SUMMARY			
PERMEABILITY (K_V)	→	38	ft/day
Corresponding K_h	→	56	ft/day
DRY DENSITY	→	95	lbs/ft^3
MOISTURE CONTENT	→	4	%
-200 FINES CONTENT	→	1	%

FALLING HEAD PERMEABILITY (ASTM D 5084)

No. of LAYERS:	3	Wt. of MOLD (lbs):	4.48
BLOWS/LAYER:	15	Wt. of MOLD/SOIL (lbs):	7.77

HEIGHT (FT)	TRIAL #1 (SEC)	PERMEABILITY
7	0.0	1.35E-02
6	1.3	1.31E-02
5	2.7	1.33E-02
4	4.4	1.26E-02
3	6.5	1.38E-02
2	9.7	
1	14.5	
	1.3E-02	cm/sec

MOISTURE CONTENT (ASTM D 2216)

Pan NUMBER	0
Wt. of WET SOIL & PAN (g)	181.8
Wt. of DRY SOIL & PAN (g)	177.8
Wt. of PAN (g)	67.1
Wt. of Water (g)	4.0
Wt. of Dry Soil (g)	110.7
MOISTURE CONTENT (%)	3.6

-200 SIEVE WASH (ASTM D 1140)

Pan NUMBER	0
Wt. of DRY SOIL & PAN (g)	177.8
Wt. of WASH SOIL & PAN (g)	176.4
Wt. of PAN (g)	67.1
Wt. of Original Dry Sample (g)	110.7
Wt. of -200 Material (g)	1.4
Wt. of Washed Dry Sample (g)	109.3
-200 FINES CONTENT (%)	1.3

NUMBER OF INCHES MOLD WAS SHORT? 0.000 INCHES (ZERO INCHES IS DEFAULT)

PERMEABILITY CONSTANT USED WAS → 0.23 (Includes 3/8"ID tubing)

NOVA